



DEVELOPMENT SERVICES DEPARTMENT
ENVIRONMENTAL COORDINATOR
450 110th Ave NE., P.O. BOX 90012
BELLEVUE, WA 98009-9012

OPTIONAL DETERMINATION OF NON-SIGNIFICANCE (DNS) NOTICE MATERIALS

The attached materials are being sent to you pursuant to the requirements for the Optional DNS Process (WAC 197-11-355). A DNS on the attached proposal is likely. This may be the only opportunity to comment on environmental impacts of the proposal. Mitigation measures from standard codes will apply. Project review may require mitigation regardless of whether an EIS is prepared. A copy of the subsequent threshold determination for this proposal may be obtained upon request.

File No. 21-102789-LO

Project Name/Address: McGowan Retaining Wall at 1406 W Lake Sammamish Pkwy. NE

Planner: Reilly Pittman
425-452-4350
rpittman@bellevuewa.gov

Minimum Comment Period: April 1, 2021

Materials included in this Notice:

- ☒ Blue Bulletin
- ☒ Checklist
- ☒ Vicinity Map
- ☒ Plans
- ☒ Other: Critical Area Narrative and Geotechnical Report

OTHERS TO RECEIVE THIS DOCUMENT:

- ☒ State Department of Fish and Wildlife
- ☒ State Department of Ecology, Shoreline Planner N.W. Region
- ☒ Army Corps of Engineers
- ☒ Attorney General
- ☒ Muckleshoot Indian Tribe

City of Bellevue Submittal Requirements	27
ENVIRONMENTAL CHECKLIST	
12/21/00	
<p><i>Thank you in advance for your cooperation and adherence to these procedures. If you need assistance in completing the checklist or have any questions regarding the environmental review process, please visit or call the Permit Center (425-452-6864) between 8 a.m. and 4 p.m., Monday through Friday (Wednesday, 10 to 4). Our TTY number is 425-452-4636.</i></p>	
<p>INTRODUCTION</p> <p>Purpose of the Checklist:</p> <p>The State Environmental Policy Act (SEPA), chapter 43.21c RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the City of Bellevue identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the City decide whether an EIS is required.</p> <p>Instructions for Applicants:</p> <p>This environmental checklist asks you to describe some basic information about your proposal. Answer the questions briefly, with the most precise information known, or give the best description you can. You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.</p> <p>Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the Planner in the Permit Center can assist you. The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. Include references to any reports or studies that you are aware of which are relevant to the answers you provide. The City may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impacts.</p> <p>Use of a Checklist for Nonproject Proposals: <i>A nonproject proposal includes plans, policies, and programs where actions are different or broader than a single site-specific proposal.</i></p> <p>For nonproject proposals, complete the Environmental Checklist even though you may answer "does not apply" to most questions. In addition, complete the Supplemental Sheet for Nonproject Actions available from Permit Processing.</p> <p>For nonproject actions, the references in the checklist to the words <i>project</i>, <i>applicant</i>, and <i>property</i> or <i>site</i> should be read as <i>proposal</i>, <i>proposer</i>, and <i>affected geographic area</i>, respectively.</p> <p>Attach an 8½" x 11" vicinity map which accurately locates the proposed site.</p>	

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BACKGROUND INFORMATION	
<p>Property Owner: Ken and Kris McGowan</p> <p>Proponent: Ken and Kris McGowan 1406 West Lake Sammamish Parkway NE Bellevue, WA 98004</p> <p>Contact Person: Kenny Booth – The Watershed Company (If different from the owner. All questions and correspondence will be directed to the individual listed.)</p> <p>Address: 750 Sixth Street South, Kirkland, WA 98033</p> <p>Phone: 425-822-5242</p>	
<p>Proposal Title:</p> <p>McGowan Retaining Wall</p> <p>Proposal Location (Street address and nearest cross street or intersection) Provide a legal description if available:</p> <p>1406 West Lake Sammamish Parkway NE Bellevue, WA 98008</p> <p>Cross Streets: West Lake Sammamish Parkway NE and North Rosemont Place</p> <p>Parcel # 7430500225</p> <p>Please attach an 8½" X 11" vicinity map that accurately locates the proposal site.</p>	



Give an accurate, brief description of the proposal's scope and nature:

General description: **The owner removed an existing block retaining wall at the toe of the steep slope just northwest of the private roadway (N. Rosemont Place) that bisects the parcel. Upon removal of the wall, the toe of the slope was excavated to accommodate a flat parking area. Because these actions occurred without proper permits from the City of Bellevue, the owner now seeks to restore the area to a state similar to the pre-existing condition. Therefore, a new block wall will be constructed in the same approximate location as the prior wall. The new wall would be backfilled with appropriate soil and planted with native plantings.**

1. Acreage of site: **According to King County iMap, the total parcel size is 13,565 square feet. The disturbed area, located immediately northwest of the private roadway, is approximately 458 square feet in size.**
2. Number of dwelling units/buildings to be demolished: **Not applicable.**
3. Number of dwelling units/buildings to be constructed: **Not applicable.**
4. Square footage of buildings to be demolished: **Not applicable.**
5. Square footage of buildings to be constructed: **Not applicable.**
6. Quantity of earth movement (in cubic yards): **Approximately 92 cubic yards of unpermitted excavation occurred. Approximately 103 cubic yards of soil will be imported to backfill the new retaining wall.**
7. Proposed land use: **The current land use R-1. No change in land use is proposed.**
9. Design features, including building height, number of stories, and proposed exterior materials: **Not applicable.**
10. Other **Not applicable.**

Estimated date of completion of the proposal or timing of phasing:

Proposed restoration activities would commence upon receipt of all applicable permits and pursuant to any wet weather restrictions.

Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No additional plans or proposals are associated with this project.

List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

McGowan Residence - Restoration Plan, The Watershed Company, January 27, 2021.

McGowan Retaining Wall – Critical Areas Narrative, The Watershed Company, February 11, 2021.

McGowan Retaining Wall - Shoreline Narrative, The Watershed Company, February 11, 2021.



Geotechnical Letter-Report McGowan Residence Wall Design, Robinson Noble, January 15, 2021

Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. List dates applied for and file numbers, if known.

Other than the open code enforcement action (20-114592-EA), no applications are currently pending related to the subject property.

List any government approvals or permits that will be needed for your proposal, if known. If permits have been applied for, list application date and file numbers, if known.

The proposal requires a Critical Areas Land Use Permit, Shoreline Exemption, and Clearing and Grading Permit from the City of Bellevue. No other permits are known to be needed.

Please provide one or more of the following exhibits, if applicable to your proposal.
(Please check appropriate box(es) for exhibits submitted with your proposal):

- ☐ Land Use Reclassification (rezone)
Map of existing and proposed zoning
- ☐ Preliminary Plat or Planned Unit Development
Preliminary plat map
- ☒ Clearing & Grading Permit
Plan of existing and proposed grading
Development plans
- ☐ Building Permit (or Design Review)
Site plan
Clearing & grading plan
- ☐ Shoreline Management Permit
Site plan



A. ENVIRONMENTAL ELEMENTS

1. EARTH

- a. General description of the site (circle one): Flat Rolling Hilly Steep slopes Mountains Other:

- b. What is the steepest slope on the site (approximate percent slope)?

There are steep slopes within the northwest portion of parcel (>40%).

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

According to Natural Resources Conservation Service (NRCS) soil maps, the project area includes Alderwood and Kitsap soils—gravelly, ashy, sandy loam—with 25 to 70 percent slopes. According to the geotechnical report for the project site, the retaining wall area consists of glacially overridden pre-Fraser sedimentary deposits.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

Not at this time.

- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Approximately 92 cubic yards of unpermitted excavation occurred. Approximately 103 cubic yards of soil will be imported to backfill the new retaining wall.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Limited erosion could occur due to exposed soils and soil import activities. However, appropriate temporary erosion control BMPs would be employed as needed.

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The proposed restoration activities do not include the placement of any new permanent impervious surfaces. The area southeast of the new wall would be covered in gravel, the same material that previously covered the area.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Temporary erosion control BMPs would be employed as needed and includes the use of straw wattle.

2. AIR

- a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

During construction, emissions to the air including equipment exhaust and dust could result from construction vehicles/equipment. These emissions would be temporary and rapidly dissipated.

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

There are no known off-site sources of emissions or odor that may affect the proposal.

- c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Standard methods of reducing impacts to air would be employed, including managing exposed soils.

3. WATER

- a. Surface:

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

Yes. The project will occur within proximity of Lake Sammamish.

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes, all proposed work will occur within 200 feet of Lake Sammamish.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

No excavation or filling will occur within wetlands or surface waters.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No intentional discharges of waste materials to surface waters would occur during restoration activities. All appropriate BMPs would be implemented to prevent such discharges.

b. Ground

1. Will ground water be withdrawn, or will water be discharged to ground water? Give a general description, purpose, and approximate quantities if known.

There will be no withdrawal of, or discharge to, ground water associated with implementation of the proposed project.

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

There will be no waste material from septic tanks or other sources discharged into the ground as part of the proposed project.

c. Water runoff (including stormwater):

1. Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

No new sources of water runoff are proposed as part of the project. Runoff quantities and flow patterns are not expected to change markedly from the pre-existing condition.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.

During construction activities, fuel, lubricant or other material spills from equipment could enter ground or surface waters. However, spill cleanup equipment would be present on-site during construction activities.

- d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Temporary erosion control BMPs would be employed as needed and will include the use of a straw wattle.

4. PLANTS

- a. Check types of vegetation found on the site and circle appropriate measurements or list species:

- ☒ deciduous tree: , , aspen,
- ☒ evergreen tree: fir, , pine,
- ☒ shrubs
- ☐ pasture
- ☐ crop or grain
- ☐ wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
- ☐ water plants: water lily, eelgrass, milfoil, other
- ☐ other types of vegetation:

- b. What kind and amount of vegetation will be removed or altered?

No vegetation will be removed as part of the proposed project. Prior unpermitted work included the removal of grasses and groundcover species. No trees were previously removed.

- c. List threatened or endangered species known to be on or near the site.

No known threatened or endangered plant species have been documented in the City of Bellevue.

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

A total of 458 square feet of site will be restored. Proposed native species include Oregon grape, western sword fern, and Roemer's fescue. Proposed restoration activities are expected to restore the site to an improved condition compared to the pre-existing condition. Upon maturity, a net gain in ecological functions is expected.

5. ANIMALS

- a. Circle any birds and animals that have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other:

mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other:

- b. List any threatened or endangered species known to be on or near the site.

Adult and juvenile chinook salmon and steelhead trout (listed as Threatened under the Federal Endangered Species Act) migrate through Lake Sammamish. Adults migrate upstream to reach spawning grounds; juveniles migrate downstream from their natal streams to reach the ocean. Lake Sammamish also contains coho salmon (Species of Concern under Federal Endangered Species Act. Lake Sammamish potentially contains bull trout, a salmonid listed as Threatened under the Federal Endangered Species Act. All work will occur in excess of 100 feet from the Lake Sammamish shoreline.

- c. Is the site part of a migration route? If so, explain.

As described above, adult and juvenile salmon migrate up and downstream, respectively, through Lake Sammamish. Kokanee salmon are also in Lake Sammamish, and migrate to and from local streams. Migrating waterfowl may use the lake as resting and foraging areas during spring and fall migrations. All work will occur in excess of 100 feet from the Lake Sammamish shoreline.

- d. Proposed measures to preserve or enhance wildlife, if any:

A total of 458 square feet of site will be restored. Proposed native species include Oregon grape, western sword fern, and Roemer's fescue. Proposed restoration activities are expected to restore the site to an improved condition compared to the pre-existing condition. Upon maturity, a net gain in ecological functions is expected.

6. ENERGY AND NATURAL RESOURCES

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

The types of energy likely to be used to implement the proposed plan include gas-powered vehicles/equipment and hand-held equipment.

- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

No such features are proposed.

7. ENVIRONMENTAL HEALTH

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

Typical environmental health hazards related to construction and landscaping could occur during implementation of the project.

- 1) Describe special emergency services that might be required.

Special emergency services are not anticipated to be required. In the unlikely event that an accident (spill, fire, other exposure) was to occur involving toxic chemicals or hazardous wastes, the local fire department's hazardous materials team would respond. If necessary, local medical services might also be required. Safety and accident response supplies would be on-site.

- 2) Proposed measures to reduce or control environmental health hazards, if any:

Standard precautions would be taken to ensure the safety of work crews. A crew supervisor would be contacted by a crew member immediately upon discovery of a spill. The crew supervisor would then ensure that the spill is cleaned up in an appropriate manner and would contact the appropriate authorities, if necessary.

- b. Noise

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Noise within the vicinity of the project area is primarily limited to vehicular traffic along East Lake Sammamish Parkway NE. However, such noise would not affect project activities.

- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Noises associated with the project would be limited to construction equipment during implementation. However, noise would be limited to normal daytime working hours pursuant to Bellevue City Code 9.18.

- 3) Proposed measures to reduce or control noise impacts, if any:

Noise would be limited to normal daytime working hours pursuant to Bellevue City Code 9.18.

8. LAND AND SHORELINE USE

- a. What is the current use of the site and adjacent properties?

The project area is located along a private road that allows access to multiple single-family homes along the Lake Sammamish waterfront. Single-family parcels are located west of the project area as well.

- b. Has the site been used for agriculture? If so, describe.

No.

- c. Describe any structures on the site.

The parcel includes a single-family residence.

- d. Will any structures be demolished? If so, what?

No.

- e. What is the current zoning classification of the site?

R-2.5.

- f. What is the current comprehensive plan designation of the site?

SF-M.

- g. If applicable, what is the current shoreline master program designation of the site?

Shoreline Residential.

- h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The on-site steep slope has been classified as an "environmentally sensitive" area.

- i. Approximately how many people would reside or work in the completed project?

Not applicable.

- j. Approximately how many people would the completed project displace?

Not applicable.

- k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable.

- l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Proposed activities would not affect existing land use.

9. HOUSING

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable.

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

Not applicable.

- c. Proposed measures to reduce or control housing impacts, if any:

No such measures are necessary.

10. AESTHETICS

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The proposed retaining wall will be a maximum of six (6) feet in height and constructed of concrete blocks.

- b. What views in the immediate vicinity would be altered or obstructed?

The project area will resemble the pre-existing condition, though new native plantings may improve views in the vicinity of the project area.

- c. Proposed measures to reduce or control aesthetic impacts, if any:

No such measures are necessary.

11. LIGHT AND GLARE

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

No light or glare will be produced by the proposed activities.

- b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

- c. What existing off-site sources of light or glare may affect your proposal?



Proposed activities would not be affected by off-site sources of light or glare.

- d. Proposed measures to reduce or control light and glare impacts, if any:

No such measures are necessary.

12. RECREATION

- a. What designated and informal recreational opportunities are in the immediate vicinity?

The project area is located approximately 120 feet from the shore of Lake Sammamish. Lake Sammamish offers fishing, boating, swimming, and bird watching opportunities.

- b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

No such measures are necessary.

13. HISTORIC AND CULTURAL PRESERVATION

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

According to the Department of Archeology and Historic Preservation's (DAHP) WISAARD (Washington Information System for Architectural and Archaeological Records Data) website, no places or objects are known to be located within the vicinity of the project area.

- b. Generally, describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

No such landmarks or evidence is known to be on or next to the site.

- c. Proposed measures to reduce or control impacts, if any:

Should historic, archeological, scientific or culturally significant items be encountered during implementation of activities, work would be temporarily stopped while the appropriate agencies are notified.

14. TRANSPORTATION

- a. Identify public streets and highways serving the site and describe proposed access to the existing street system. Show on site plans, if any.

Access to the site is via NE Rosemont Place. Access will not change as a result of the project.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The nearest King County Metro transit stop is located southwest of the project site, at the intersection of Northup Way and NE 10th Street.



- c. How many parking spaces would the completed project have? How many would the project eliminate?

The proposed plan would not create or eliminate parking spaces.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

The project will not use, or occur in the immediate vicinity of, water, rail, or air transportation.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

Traffic generation would not change as a result of the proposed project.

- g. Proposed measures to reduce or control transportation impacts, if any:

No such measures are necessary.

15. PUBLIC SERVICES

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

- b. Proposed measures to reduce or control direct impacts on public services, if any.

No such measures are necessary.

16. UTILITIES

- a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.
- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

No additional utilities are proposed as part of the project.

Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

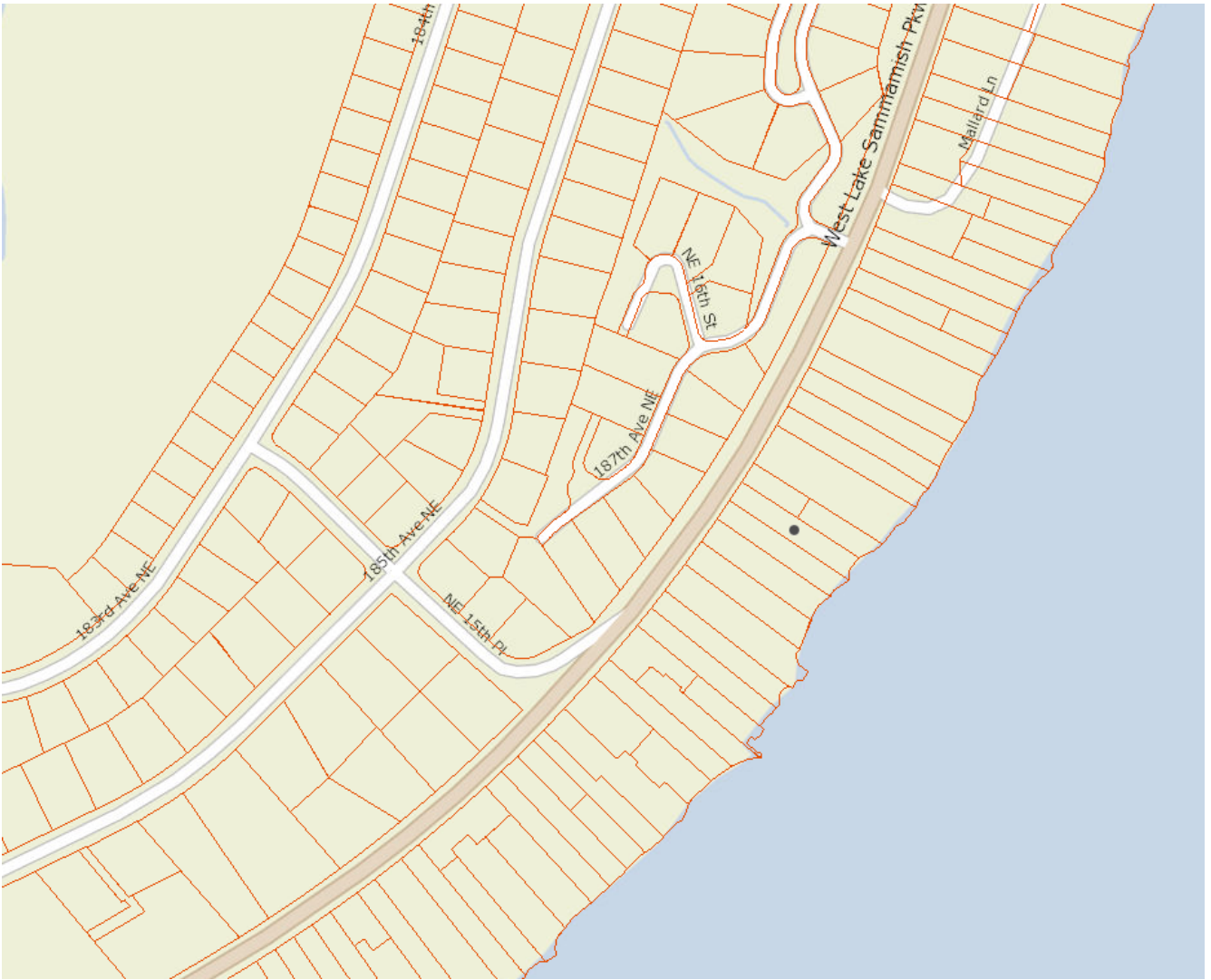
RP

Key Book

Date Submitted: 2-11-21

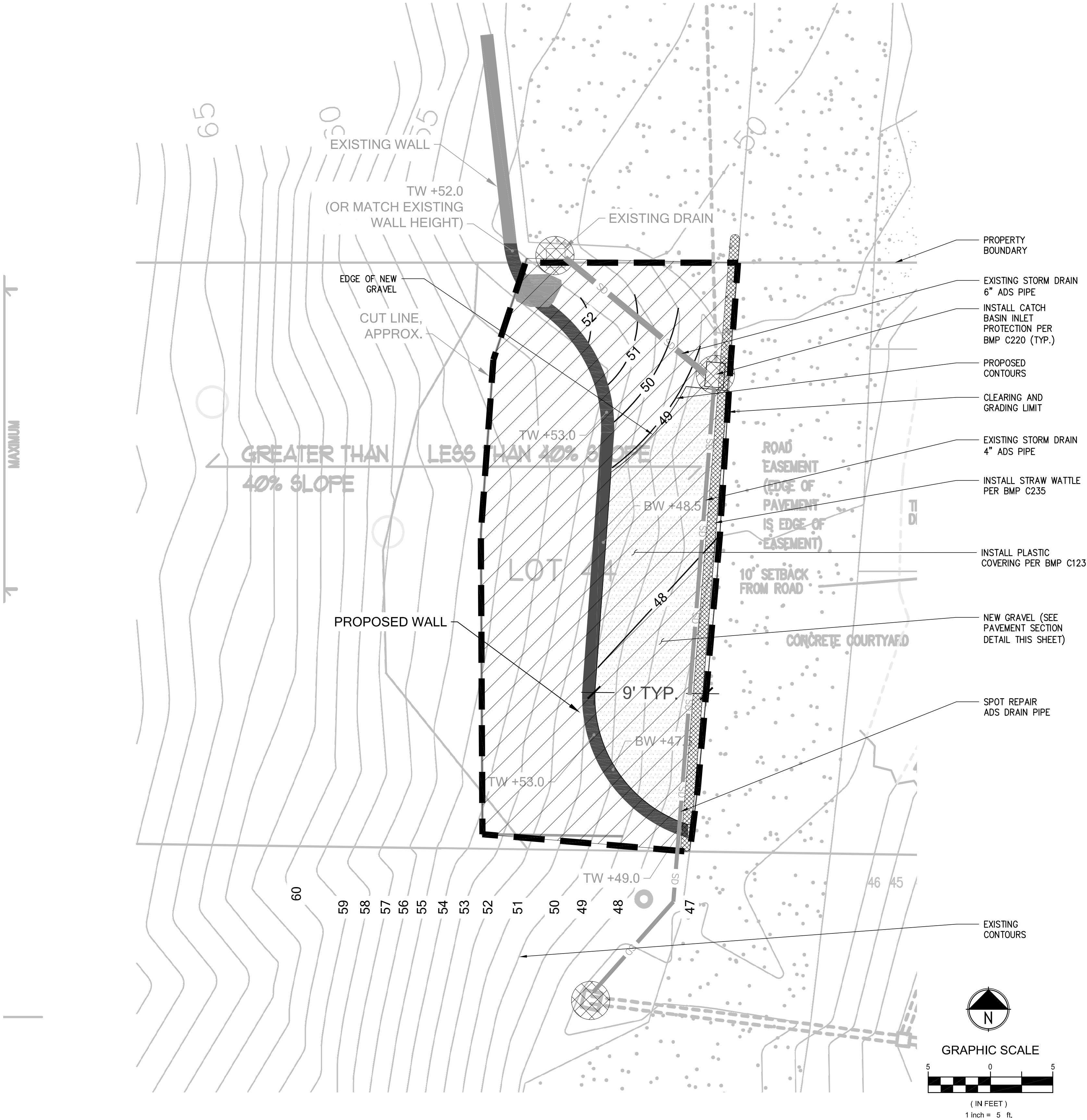
This map of Bellevue, Washington, illustrates the city's urban layout and its proximity to Lake Sammamish. The city is divided into several distinct neighborhoods, including Overlake to the north, Highlands to the west, and Kenilworth to the east. Major thoroughfares such as NE 40th St, NE 30th St, and NE 24th St are clearly marked, along with the prominent Bellevue Redmond Rd. The city's eastern boundary is defined by Lake Sammamish, with the city's name 'Bellevue' prominently displayed in the lower-left quadrant. The map also shows the city's connection to the surrounding region via the SR 202 corridor.







FOR PERMIT
These drawings are prepared for a preliminary construction permit. The Engineer shall not use these drawings for construction until Contractor obtains written approval for use in construction by the jurisdiction having authority and DCI Engineers.



LEGEND

- PLASTIC COVERING PER BMP C123
- NEW GRAVEL

LEGAL DESCRIPTION

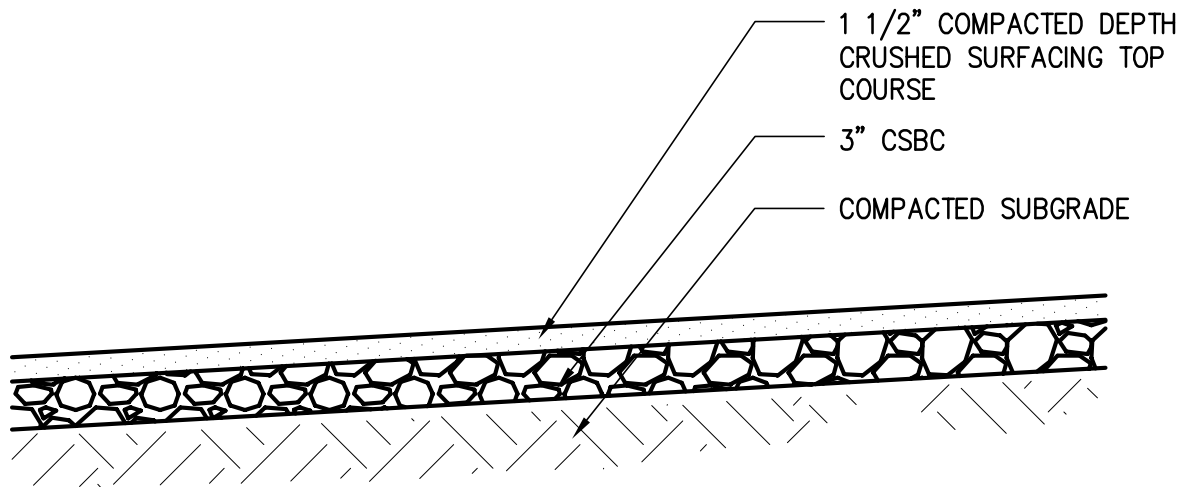
ROSEMONT BEACH ADD PLAT LOT 44

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEY FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEY, FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION CONTACT THE UTILITY OWNER/AGENCY.

CLEAR AND GRADING STANDARD NOTES

- ALL CLEARING & GRADING CONSTRUCTION MUST BE IN ACCORDANCE WITH CITY OF BELLEVUE (COB) CLEARING & GRADING CODE, CLEARING & GRADING DEVELOPMENT STANDARDS, LAND USE CODE, UNIFORM BUILDING CODE, PERMIT CONDITIONS, AND ALL OTHER APPLICABLE CODES, ORDINANCES, AND STANDARDS. THE DESIGN ELEMENTS WITHIN THESE PLANS HAVE BEEN REVIEWED ACCORDING TO THESE REQUIREMENTS. ANY VARIANCE FROM ADOPTED EROSION CONTROL STANDARDS IS NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY THE CITY OF BELLEVUE DEVELOPMENT SERVICES (DSD) PRIOR TO CONSTRUCTION.
- IT SHALL BE THE SOLE RESPONSIBILITY OF THE APPLICANT AND THE PROFESSIONAL CIVIL ENGINEER TO CORRECT ANY ERROR, OMISSION, OR VARIATION FROM THE ABOVE REQUIREMENTS FOUND IN THESE PLANS. ALL CORRECTIONS SHALL BE AT NO ADDITIONAL COST OR LIABILITY TO THE COB.
- APPROVAL OF THIS EROSION/SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC).
- A COPY OF THE APPROVED PLANS AND DRAWINGS MUST BE ON-SITE DURING CONSTRUCTION. THE APPLICANT IS RESPONSIBLE FOR OBTAINING ANY OTHER REQUIRED OR RELATED PERMITS PRIOR TO BEGINNING CONSTRUCTION.
- THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
- THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
- THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
- ALL LOCATIONS OF EXISTING UTILITIES HAVE BEEN ESTABLISHED BY FIELD SURVEY OR OBTAINED FROM AVAILABLE RECORDS AND SHOULD, THEREFORE, BE CONSIDERED ONLY APPROXIMATE AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS AND TO DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.
- THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
- CLEARING SHALL BE LIMITED TO THE AREAS WITHIN THE APPROVED DISTURBANCE LIMITS. EXPOSED SOILS MUST BE COVERED AT THE END OF EACH WORKING DAY WHEN WORKING FROM OCTOBER 1ST THROUGH APRIL 30TH. FROM MAY 1ST THROUGH SEPTEMBER 30TH, EXPOSED SOILS MUST BE COVERED AT THE END OF EACH CONSTRUCTION WEEK AND ALSO AT THE THREAT OF RAIN.
- AT NO TIME SHALL MORE THAN ONE FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
- STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT.
- THE CONTRACTOR MUST MAINTAIN A SWEEPER ON SITE DURING EARTHWORK AND IMMEDIATELY REMOVE SOIL THAT HAS BEEN TRACKED ONTO PAVED AREAS AS RESULT OF CONSTRUCTION.
- THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
- ANY EXCAVATED MATERIAL REMOVED FROM THE CONSTRUCTION SITE AND DEPOSITED ON PROPERTY WITHIN THE CITY LIMITS MUST BE DONE IN COMPLIANCE WITH A VALID CLEARING & GRADING PERMIT. LOCATIONS FOR THE MOBILIZATION AREA AND STOCKPILED MATERIAL MUST BE APPROVED BY THE CLEARING AND GRADING INSPECTOR AT LEAST 24 HOURS IN ADVANCE OF ANY STOCKPIILING.
- THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.
- FINAL SITE GRADING MUST DIRECT DRAINAGE AWAY FROM ALL BUILDING STRUCTURES AT A MINIMUM 5% SLOPE, PER THE INTERNATIONAL RESIDENTIAL CODE (IRC) R401.3.



PROJECT CONTACTS

NAME: KENNETH AND KRISTINE MCGOWAN
PHONE NUMBER: (206) 799-8924



MCGOWAN RESIDENCE

1406 WEST LAKE SAMMAMISH PARKWAY NE
BELLEVUE, WA 98008

PROJECT TITLE:

SHEET TITLE:

T.E.S.C. & SITE PLAN

SHEET NO.

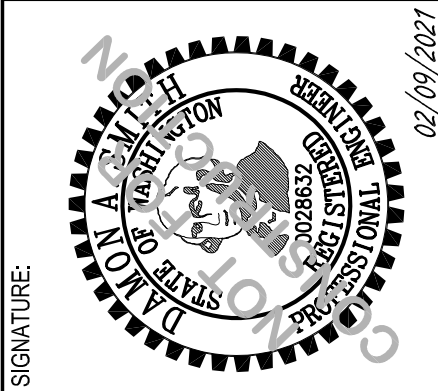
C-1

REVISIONS:

APPROVALS:

Job No.:	2012-0008
Proj. Manager:	MJF
Designed:	MJF
Reviewed:	MJF
Drawn:	PKS
Dwg. Checked:	MJF
Scale:	1"=5'

SIGNATURE:

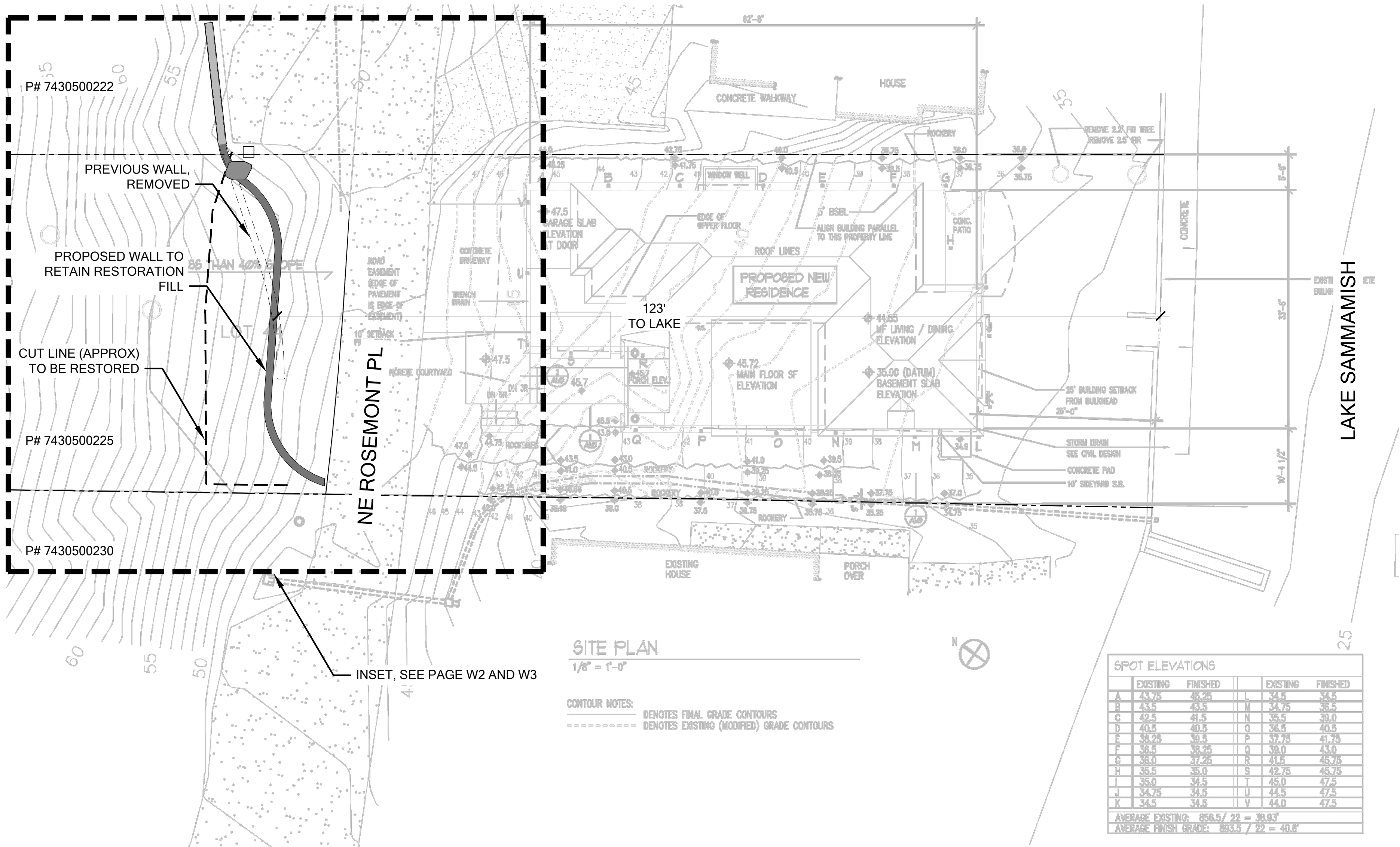
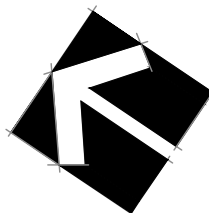


PREPARED BY:

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CIVIL STRUCTURAL
AND TRAFFIC ENGINEERING

PROJECT OVERVIEW

SCALE 1" = 10'



SITE PLAN
1/8" = 1'-0"

CONTOUR NOTES:
————— DENOTES FINAL GRADE CONTOURS
- - - - - DENOTES EXISTING (MODIFIED) GRADE CONTOURS

SPOT ELEVATIONS					
	EXISTING	FINISHED		EXISTING	FINISHED
A	43.75	46.25	L	34.5	34.5
B	43.5	43.5	M	34.75	36.5
C	42.5	41.5	N	35.5	38.0
D	40.5	40.5	O	38.5	40.5
E	38.25	39.5	P	37.75	41.75
F	38.5	38.25	Q	38.0	43.0
G	38.0	37.25	R	41.5	45.75
H	35.5	36.0	S	42.75	45.75
I	35.0	34.5	T	45.0	47.5
J	34.75	34.5	U	44.5	47.5
K	34.5	34.5	V	44.0	47.5
AVERAGE EXISTING: 866.5 / 22 = 39.35'					
AVERAGE FINISH GRADE: 893.5 / 22 = 40.6'					



VICINITY MAP

SHEET INDEX

W1	PROJECT OVERVIEW
W2	EXISTING CONDITIONS
W3	SITE PLAN, PLANTING PLAN, AND SCHEDULE
W4	PLANTING INSTALLATION DETAILS AND NOTES

NOTES

- 1 THE BASE FILE USED WITHIN THIS RESTORATION PLAN IS A PDF SITE PLAN DATED NOVEMBER 1999 PRODUCED BY DAVID VANDERVORT AND RECEIVED BY THE WATERSHED COMPANY IN OCTOBER 2020.
- 2 THE PREVIOUS WALL, WHICH WAS REMOVED BY OWNERS, WAS INSTALLED SUBSEQUENT TO THE BASE FILE USED HEREIN, AND AS SUCH, THE TOPOGRAPHY SHOWN DOES REPRESENT THE WALL STRUCTURE. LOCATION OF WALL WAS APPROXIMATED USING AERIAL IMAGERY.

PERMIT SET - NOT FOR CONSTRUCTION



750 Sixth Street South
Kirkland WA 98033

p 425.822.5242
www.watershedco.com
Science & Design

MCGOWAN RESIDENCE
RESTORATION PLAN
PREPARED FOR KEN AND KRIS MCGOWAN
PARCEL # 7430500225
1406 WEST LAKE SAMMAMISH PARKWAY SE
BELLEVUE, WA 98004

SUBMITTALS & REVISIONS		BY	DATE	DESCRIPTION
NO.	1	AF	01-27-2021	RESTORATION PLAN

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: KB
DESIGNED: AF
DRAFTED: AF
CHECKED: MF/KB
JOB NUMBER:

200940
SHEET NUMBER:
W1 OF 4



MCGOWAN RESIDENCE

RESTORATION PLAN
PREPARED FOR KEN AND KRIS MCGOWAN

PARCEL # 7430500225

LAKE SAMMAMISH PA
BELLEVUE, WA 98004

[illegible]

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34"
SCALE ACCORDINGLY.

PROJECT MANAGER: KB
DESIGNED: AF
DRAFTED: AF
CHECKED: MF/KB
JOB NUMBER:

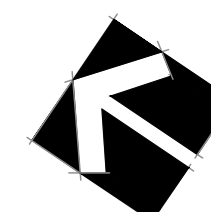
200940

SHEET NUMBER:
W2 OF 4


DATE	PRINTED BY	FILE NAME
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SCALE $\frac{1}{4}" = 1'$

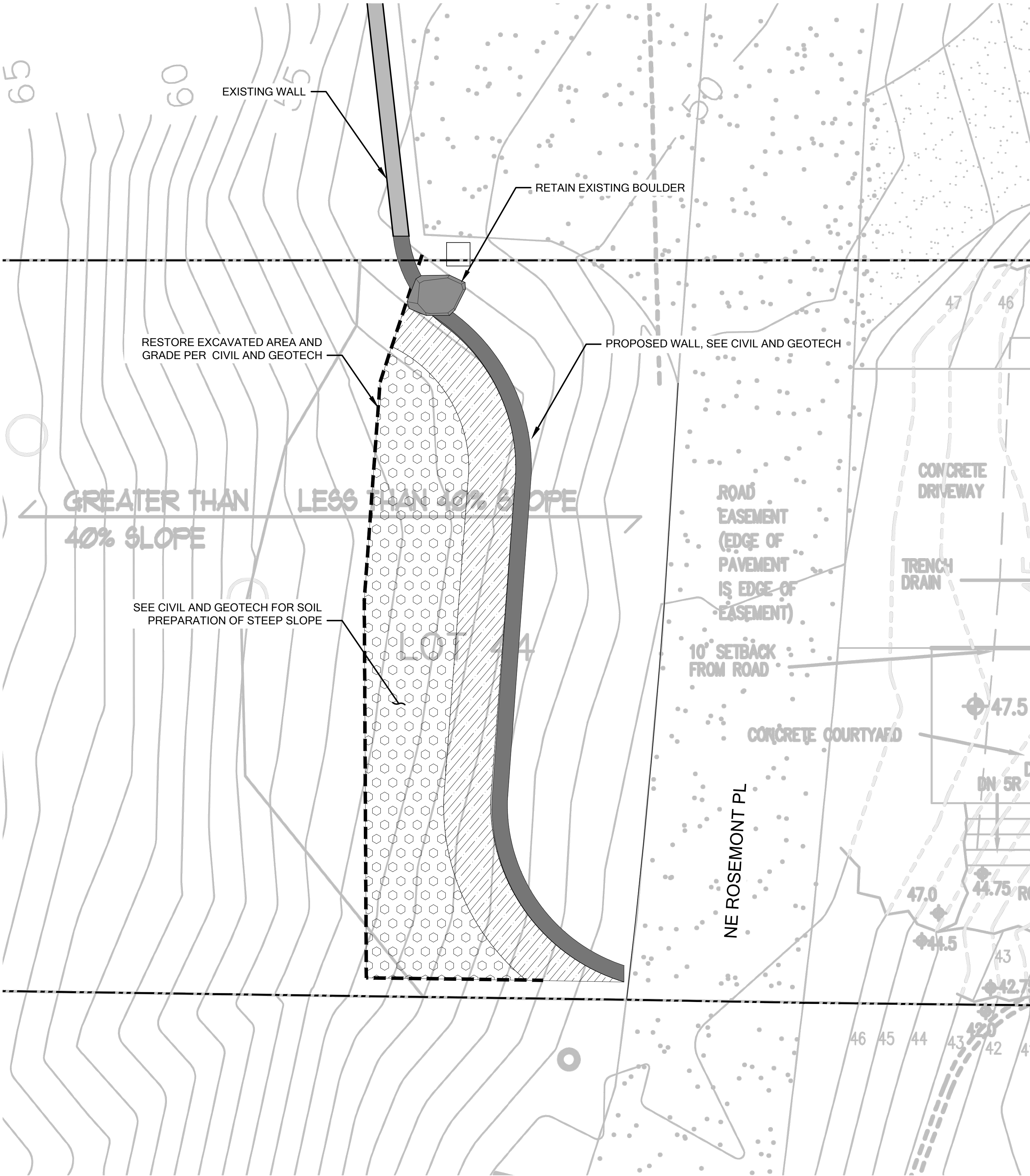


LEGEND

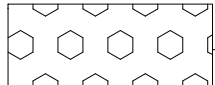
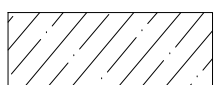
- PARCEL BOUNDARY
 AREA OF EXCAVATION (APPROX. 458 SF)

NOTES

- | | |
|---|---|
| 1 | ESTIMATED TYPE OF VEGETATION REMOVED WAS A MIX OF NATIVE GROUNDCOVERS AND GRASSES. NO SIGNIFICANT TREES OR SHRUBS WERE REMOVED. |
|---|---|



PLANT SCHEDULE

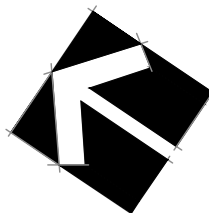
BOTANICAL / COMMON NAME		QTY	SIZE	% FILL/ SPACING
 230 SF	MAHONIA NERVOSA / OREGON GRAPE	30	1 GALLON	50% @ 2' O.C.
	POLYSTICHUM MUNITUM / WESTERN SWORD FERN	30	1 GALLON	50% @ 2' O.C.
NOTE: GROUP GROUNDCOVERS BY SPECIES AND PLANT IN GROUPS OF 5-7.				
 139 SF	FESTUCA IDAHOENSIS ROEMERI / ROEMER'S FESCUE	36	1 GALLON	2' O.C.

NOTES

- SEE PLANT INSTALLATION SPECIFICATIONS AND DETAILS ON PAGE W4.
- GROUNDCOVERS AND GRASSES SHALL BE PLANTED USING TRIANGULAR SPACING.

SITE PLAN, PLANTING PLAN AND SCHEDULE

SCALE 1/4" = 1'



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PERMIT SET - NOT FOR CONSTRUCTION

SUBMITTALS & REVISIONS		BY	DATE	DESCRIPTION
NO.	DATE	DESCRIPTION	BY	DATE
1	01-27-2021	RESTORATION PLAN	AF	

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: KB
DESIGNED: AF
DRAFTED: AF
CHECKED: MF/KB
JOB NUMBER:
200940
SHEET NUMBER:
W3 OF 4

PLANT INSTALLATION SPECIFICATIONS

GENERAL NOTES

- QUALITY ASSURANCE
- PLANTS SHALL MEET OR EXCEED THE SPECIFICATIONS OF FEDERAL, STATE, AND LOCAL LAWS REQUIRING INSPECTION FOR PLANT DISEASE AND INSECT CONTROL.
 - PLANTS SHALL BE HEALTHY, VIGOROUS, AND WELL-FORMED, WITH WELL DEVELOPED, FIBROUS ROOT SYSTEMS, FREE FROM DEAD BRANCHES OR ROOTS. PLANTS SHALL BE FREE FROM DAMAGE CAUSED BY TEMPERATURE EXTREMES, LACK OR EXCESS OF MOISTURE, INSECTS, DISEASE, AND MECHANICAL INJURY. PLANTS IN LEAF SHALL BE WELL FOLIATED AND OF GOOD COLOR. PLANTS SHALL BE HABITUATED TO THE OUTDOOR ENVIRONMENTAL CONDITIONS INTO WHICH THEY WILL BE PLANTED (HARDENED-OFF).
 - TREES WITH DAMAGED, CROOKED, MULTIPLE OR BROKEN LEADERS WILL BE REJECTED. WOODY PLANTS WITH ABRASIONS OF THE BARK OR SUN SCALD WILL BE REJECTED.
 - NOMENCLATURE: PLANT NAMES SHALL CONFORM TO FLORA OF THE PACIFIC NORTHWEST BY HITCHCOCK AND CRONQUIST, UNIVERSITY OF WASHINGTON PRESS, 2018 AND/OR TO A FIELD GUIDE TO THE COMMON WETLAND PLANTS OF WESTERN WASHINGTON & NORTHWESTERN OREGON, ED. SARAH SPEAR COOKE, SEATTLE AUDUBON SOCIETY, 1997.

DEFINITIONS

- PLANTS/PLANT MATERIALS. PLANTS AND PLANT MATERIALS SHALL INCLUDE ANY LIVE PLANT MATERIAL USED ON THE PROJECT. THIS INCLUDES BUT IS NOT LIMITED TO CONTAINER GROWN, B&B OR BAREROOT PLANTS; LIVE STAKES AND FASCINES (WATTLES); TUBERS, CORMS, BULBS, ETC.; SPRIGS, PLUGS, AND LINERS.
- CONTAINER GROWN. CONTAINER GROWN PLANTS ARE THOSE WHOSE ROOTBALLS ARE ENCLOSED IN A POT OR BAG IN WHICH THAT PLANT GREW.

SUBSTITUTIONS

- IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN SPECIFIED MATERIALS IN ADVANCE IF SPECIAL GROWING, MARKETING OR OTHER ARRANGEMENTS MUST BE MADE IN ORDER TO SUPPLY SPECIFIED MATERIALS.
- SUBSTITUTION OF PLANT MATERIALS NOT ON THE PROJECT LIST WILL NOT BE PERMITTED UNLESS AUTHORIZED IN WRITING BY THE RESTORATION CONSULTANT.
- IF PROOF IS SUBMITTED THAT ANY PLANT MATERIAL SPECIFIED IS NOT OBTAINABLE, A PROPOSAL WILL BE CONSIDERED FOR USE OF THE NEAREST EQUIVALENT SIZE OR ALTERNATIVE SPECIES, WITH CORRESPONDING ADJUSTMENT OF CONTRACT PRICE.
- SUCH PROOF WILL BE SUBSTANTIATED AND SUBMITTED IN WRITING TO THE CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION.

INSPECTION

- PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE RESTORATION CONSULTANT FOR CONFORMANCE TO SPECIFICATIONS, EITHER AT TIME OF DELIVERY ON-SITE OR AT THE GROWER'S NURSERY. APPROVAL OF PLANT MATERIALS AT ANY TIME SHALL NOT IMPAIR THE SUBSEQUENT RIGHT OF INSPECTION AND REJECTION DURING PROGRESS OF THE WORK.
- PLANTS INSPECTED ON SITE AND REJECTED FOR NOT MEETING SPECIFICATIONS MUST BE REMOVED IMMEDIATELY FROM SITE OR RED-TAGGED AND REMOVED AS SOON AS POSSIBLE.
- THE RESTORATION CONSULTANT MAY ELECT TO INSPECT PLANT MATERIALS AT THE PLACE OF GROWTH. AFTER INSPECTION AND ACCEPTANCE, THE RESTORATION CONSULTANT MAY REQUIRE THE INSPECTED PLANTS BE LABELED AND RESERVED FOR PROJECT. SUBSTITUTION OF THESE PLANTS WITH OTHER INDIVIDUALS, EVEN OF THE SAME SPECIES AND SIZE, IS UNACCEPTABLE.

MEASUREMENT OF PLANTS

- PLANTS SHALL CONFORM TO SIZES SPECIFIED UNLESS SUBSTITUTIONS ARE MADE AS OUTLINED IN THIS CONTRACT.
- HEIGHT AND SPREAD DIMENSIONS SPECIFIED REFER TO MAIN BODY OF PLANT AND NOT BRANCH OR ROOT TIP TO TIP. PLANT DIMENSIONS SHALL BE MEASURED WHEN THEIR BRANCHES OR ROOTS ARE IN THEIR NORMAL POSITION.
- WHERE A RANGE OF SIZE IS GIVEN, NO PLANT SHALL BE LESS THAN THE MINIMUM SIZE AND AT LEAST 50% OF THE PLANTS SHALL BE AS LARGE AS THE MEDIAN OF THE SIZE RANGE. (EXAMPLE: IF THE SIZE RANGE IS 12" TO 18", AT LEAST 50% OF PLANTS MUST BE 15" TALL.).

SUBMITTALS

PROPOSED PLANT SOURCES

- WITHIN 45 DAYS AFTER AWARD OF THE CONTRACT, SUBMIT A COMPLETE LIST OF PLANT MATERIALS PROPOSED TO BE PROVIDED DEMONSTRATING CONFORMANCE WITH THE REQUIREMENTS SPECIFIED. INCLUDE THE NAMES AND ADDRESSES OF ALL GROWERS AND NURSERIES.

PRODUCT CERTIFICATES

- PLANT MATERIALS LIST - SUBMIT DOCUMENTATION TO CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION THAT PLANT MATERIALS HAVE BEEN ORDERED. ARRANGE PROCEDURE FOR INSPECTION OF PLANT MATERIAL WITH CONSULTANT AT TIME OF SUBMISSION.
- HAVE COPIES OF VENDOR'S OR GROWERS' INVOICES OR PACKING SLIPS FOR ALL PLANTS ON SITE DURING INSTALLATION. INVOICE OR PACKING SLIP SHOULD LIST SPECIES BY SCIENTIFIC NAME, QUANTITY, AND DATE DELIVERED (AND GENETIC ORIGIN IF THAT INFORMATION WAS PREVIOUSLY REQUESTED).

DELIVERY, HANDLING, & STORAGE

NOTIFICATION

CONTRACTOR MUST NOTIFY CONSULTANT 48 HOURS OR MORE IN ADVANCE OF DELIVERIES SO THAT CONSULTANT MAY ARRANGE FOR INSPECTION.

PLANT MATERIALS

- TRANSPORTATION - DURING SHIPPING, PLANTS SHALL BE PACKED TO PROVIDE PROTECTION AGAINST CLIMATE EXTREMES, BREAKAGE AND DRYING. PROPER VENTILATION AND PREVENTION OF DAMAGE TO BARK, BRANCHES, AND ROOT SYSTEMS MUST BE ENSURED.
- SCHEDULING AND STORAGE - PLANTS SHALL BE DELIVERED AS CLOSE TO PLANTING AS POSSIBLE. PLANTS IN STORAGE MUST BE PROTECTED AGAINST ANY CONDITION THAT IS DETRIMENTAL TO THEIR CONTINUED HEALTH AND VIGOR.
- HANDLING - PLANT MATERIALS SHALL NOT BE HANDLED BY THE TRUNK, LIMBS, OR FOLIAGE BUT ONLY BY THE CONTAINER, BALL, BOX, OR OTHER PROTECTIVE STRUCTURE, EXCEPT BAREROOT PLANTS SHALL BE KEPT IN BUNDLES UNTIL PLANTING AND THEN HANDLED CAREFULLY BY THE TRUNK OR STEM.
- LABELS - PLANTS SHALL HAVE DURABLE, LEGIBLE LABELS STATING CORRECT SCIENTIFIC NAME AND SIZE. TEN PERCENT OF CONTAINER GROWN PLANTS IN INDIVIDUAL POTS SHALL BE LABELED. PLANTS SUPPLIED IN FLATS, RACKS, BOXES, BAGS, OR BUNDLES SHALL HAVE ONE LABEL PER GROUP.

WARRANTY

PLANT WARRANTY

PLANTS MUST BE GUARANTEED TO BE TRUE TO SCIENTIFIC NAME AND SPECIFIED SIZE, AND TO BE HEALTHY AND CAPABLE OF VIGOROUS GROWTH.

REPLACEMENT

- PLANTS NOT FOUND MEETING ALL OF THE REQUIRED CONDITIONS AT THE CONSULTANT'S DISCRETION MUST BE REMOVED FROM SITE AND REPLACED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
- PLANTS NOT SURVIVING AFTER ONE YEAR TO BE REPLACED AT THE CONTRACTOR'S EXPENSE.

PLANT MATERIAL

GENERAL

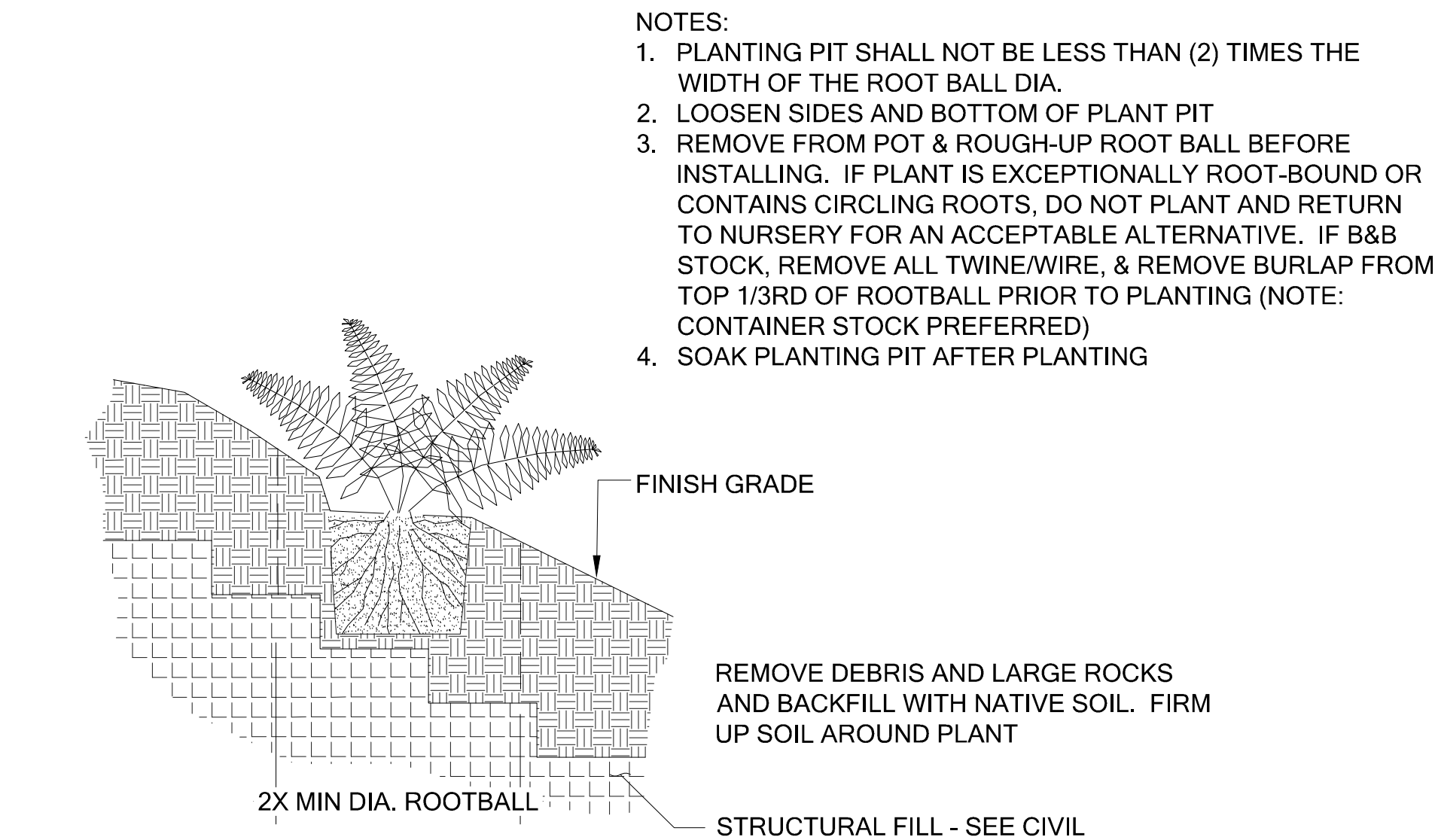
- PLANTS SHALL BE NURSERY GROWN IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICES UNDER CLIMATIC CONDITIONS SIMILAR TO OR MORE SEVERE THAN THOSE OF THE PROJECT SITE.
- PLANTS SHALL BE TRUE TO SPECIES AND VARIETY OR SUBSPECIES. NO CULTIVARS OR NAMED VARIETIES SHALL BE USED UNLESS SPECIFIED AS SUCH.

QUANTITIES

SEE PLANT LIST ON ACCOMPANYING PLANS AND PLANT SCHEDULES.

ROOT TREATMENT

- CONTAINER GROWN PLANTS (INCLUDES PLUGS): PLANT ROOT BALLS MUST HOLD TOGETHER WHEN THE PLANT IS REMOVED FROM THE POT, EXCEPT THAT A SMALL AMOUNT OF LOOSE SOIL MAY BE ON THE TOP OF THE ROOTBALL.
- PLANTS MUST NOT BE ROOT-BOUND; THERE MUST BE NO CIRCLING ROOTS PRESENT IN ANY PLANT INSPECTED.
- ROOTBALLS THAT HAVE CRACKED OR BROKEN WHEN REMOVED FROM THE CONTAINER SHALL BE REJECTED.



1 CONTAINER PLANTING DETAIL

Scale: NTS

PLANT INSTALLATION DETAILS AND NOTES



750 Sixth Street South
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BELLEVUE, WA 98004

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY	AF						
1	01-27-2021	RESTORATION PLAN								

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: KB
DESIGNED: AF
DRAFTED: AF
CHECKED: MF/KB
JOB NUMBER:

200940

SHEET NUMBER:

W4 OF 4

TECHNICAL MEMORANDUM



Date: February 10, 2021
To: Ken and Kris McGowan
From: Kenny Booth, AICP; Amanda Fleischman, MLA
TWC Project Number: 200940
Project Name: McGowen Retaining Wall

Subject: Critical Areas Narrative

This memo is intended to provide an overview of the McGowen Retaining Wall project, while also documenting how the project complies with specific City of Bellevue critical area regulations.

Description of the project site, including landscape features, existing development, and site history as applicable.

Response: The project site is located along the shoreline of Lake Sammamish, with the parcel bounded to the west by West Lake Sammamish Parkway NE. A private roadway (North Rosemont Place) bisects the parcel and provides vehicular access to the site. A single-family residence is located between the private roadway and the shoreline. A forested area slopes up steeply toward the west from the private roadway. The slope exceeds 40 percent and is therefore regulated as a critical area pursuant to LUC 20.25H.120. A 75-foot setback from the toe of the slope also applies.

Recently, the owner removed an existing block retaining wall at the toe of the slope. Upon removal of the wall, the toe of the slope was excavated to accommodate a flat parking area. It is estimated that approximately 92 cubic yards of soil was removed from the area. Vegetation removal consisted of grasses and groundcover species; no trees were removed. No wetlands or streams were observed within the vicinity of the site and there are no indications that habitat associated with species of local importance are present.

Because wall removal and slope excavation occurred without proper permits from the City of Bellevue, the owner now seeks to restore the area to a state similar to the pre-existing condition. Therefore, a new block wall will be constructed in the same approximate location as the prior wall. The new wall will consist of stone blocks, backfilled with structural fill. Proper drainage and vegetative restoration will also occur.

A description of how the design constitutes the minimum necessary impact to the critical area.

Response: The project area will be returned to a state similar to the pre-existing condition. However, design standards may result in improved drainage functions and increased critical area functions through the planting of native shrubs and groundcover.

A description of why there is no feasible alternative with less impact to the critical area, critical area buffer, or critical area structure setback.

Response: The goal of the project is to return the area to a state similar to the pre-existing condition. This will be accomplished through the construction of a new wall within the same approximate location as the pre-existing wall. A 'no action' alternative would result in retention of the excavated toe of slope, resulting in greater critical area impacts. Therefore, this alternative is not feasible. Additionally, no other alternative that restores the slope will result in less impact to the critical area or its buffer/setback.

A description of alternatives considered and why the alternative selected is preferred.

Response: As described above, a 'no action' alternative would result in retention of the excavated toe of slope, resulting in greater critical area impacts. Therefore, this alternative is not feasible. Additionally, no other alternative that restores the slope results in less impact to the critical area or its buffer/setback.

A summary of how the proposal meets each of the decision criteria contained in Land Use Code Section 20.30P.

A. The proposal obtains all other permits required by the Land Use Code;

Response: This narrative accompanies an application for a Critical Areas Land Use Permit (LO), with SEPA review. A Shoreline Exemption has also been submitted concurrently. A Clearing and Grading Permit will also be necessary to authorize implementation of the restoration plan. No other permits from the City of Bellevue are expected to be necessary.

B. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer;

Response: The goal of this project is to return the project area to a state similar to pre-existing conditions. Work will include restoration of the rebuilt slope with native shrubs and groundcover. Standard BMPs will be followed to minimize disturbance during

construction, including appropriate erosion control measures. These actions will result in the minimum necessary disturbance to the critical area and setback.

- C. *The proposal incorporates the performance standards of Part [20.25H](#) LUC to the maximum extent applicable;*

Response: See below for geologic hazard area (per LUC 20.25H.125) performance standard compliance.

- D. *The proposal will be served by adequate public facilities including streets, fire protection, and utilities;*

Response: The project area will be served by adequate public facilities. The need for new services will not result from the proposed project.

- E. *The proposal includes a mitigation or restoration plan consistent with the requirements of LUC [20.25H.210](#); except that a proposal to modify or remove vegetation pursuant to an approved Vegetation Management Plan under LUC 20.25H.055.C.3.i shall not require a mitigation or restoration plan;*

Response: A restoration plan has been prepared in accordance with the requirements of LUC 20.25H.210. The plan (*McGowan Residence – Restoration Plan*, The Watershed Company, January 27, 2021) has been submitted concurrently with this project narrative.

- F. *The proposal complies with other applicable requirements of this code.*

Response: The proposed project complies with all other applicable City of Bellevue Land Use Codes.

A summary of how the proposal meets each of the criteria and performance standards contained in Land Use Code Section 20.25H associated with the critical area you are modifying.

Response: The goal of this project is to return the project area to a state similar to pre-existing conditions. Work will include restoration of the rebuilt slope with native shrubs and groundcover. Compliance with the geologic hazard area performance standards (20.25H.125) is presented below. Additional information can be found in the *Geotechnical Letter-Report McGowan Residence Wall Design*, by Robinson Noble, and dated January 15, 2021.

20.025H.125 - Performance Standards – Landslide Hazards and Steep Slopes

- A. *Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography;*

Response: The project involves restoration of unpermitted slope disturbance. No further disturbance to the slope will occur as a result of the project. The prior disturbed area will be returned to a condition similar to the pre-existing condition, through the construction of a new retaining wall and the installation of native shrubs and groundcover.

- B. *Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;*

Response: The proposed retaining wall will be constructed in the same approximate location as the removed wall. No further permanent disturbance to the steep slope will occur as a result of the project.

- C. *The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties;*

Response: The proposed retaining wall will replace a pre-existing wall that was removed without permits. Design standards may result in improved drainage functions and increased critical area functions through the planting of native shrubs and groundcover.

- D. *The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall;*

Response: The proposed retaining wall will replace a pre-existing wall that was removed without permits. The wall be of a similar size and nature; however, design standards may result in improved drainage functions and increased critical area functions through the planting of native shrubs and groundcover

- E. *Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer;*

Response: The proposed restoration activities do not include the placement of any new permanent impervious surfaces. The area southeast of the new wall would be covered in gravel, the same material that previously covered the area.

- F. *Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with this criteria;*

Response: The only topographic modification proposed is a return to pre-existing conditions.

- G. *Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation;*

Response: No new buildings are proposed.

- H. *On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification;*

Response: No new buildings are proposed.

- I. *On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types; and*

Response: No new parking or garages are proposed.

- J. *Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.*

Response: A restoration plan has been prepared in accordance with the requirements of LUC 20.25H.210. The plan (*McGowan Residence – Restoration Plan*, The Watershed Company, January 27, 2021) has been submitted concurrently with this project narrative. Proposed native species include Oregon grape, western sword fern, and Roemer's fescue. Plantings represent a diverse native plant assemblage appropriate to the eco-region and consistent with backfill and soil stability parameters and set by the project geotechnical consultant. New plantings will provide food, cover, and nesting opportunities for wildlife. When accounting for project improvements, as well as the aforementioned ecological improvements, the project will result in no net loss of critical area functions and values.



January 15, 2021

Mr. Kenneth McGowan
1406 West Lake Sammamish Parkway Northeast
Bellevue, Washington 98008

Geotechnical Letter-Report
McGowan Residence Wall Design
Bellevue, Washington
RN File No. 3471-001A

Dear Mr. McGowan:

Introduction

This letter provides design recommendations for construction of a new modular block wall to restore slope conditions to original configurations prior to unpermitted excavations into the toe of a steep slope at the property.

Project Description

We understand that an excavation cut was performed west of your existing residence and property access road, in the area of a toe to a steep slope hazard. The plan was to create additional parking for your residential property. Your contractor did not obtain permits for the wall construction and the City of Bellevue has requested that the slope be returned back to original conditions prior to excavations prepared at the site. As part of this work, vegetation will need to be reestablished above the new retaining wall consisting of plant species native to the Pacific Northwest.

You have requested that we complete this geotechnical letter to document and evaluate existing conditions at the site and to provide recommendations for geotechnical design elements of the proposed project.

SITE CONDITIONS

Geologic Setting

The geologic units for this area are mapped on the [Geologic Map of the Issaquah 7.5' Quadrangle, King County, Washington](#), by Derek B. Booth, et al. (U.S. Geological Survey, 2006). The site is mapped as being underlain by pre-Fraser deposits in the area of the planned wall construction. Alluvial deposits are mapped east of the site access road. Advance outwash and glacial till are mapped west of West Lake Sammamish Parkway. Our site explorations encountered pre-Fraser deposits consistent with the mapped geology.

Critical Areas Designations

We have reviewed the City of Bellevue Critical Hazards Map for critical area classification within the site. Bellevue lists the site as part of a liquefaction hazard area in the area of the existing residence in the eastern region of the site and steep slope (greater than 40 percent slopes) and very severe erosion hazard areas on the steep slope in the subject wall area of the project.

Surface Conditions

The rectangular-shaped site is about 0.2 acres in size and has maximum dimensions of approximately 300 feet in the southeast-northwest direction and 50 feet in the northeast-southwest direction. Access to the site is provided by a private access road extending east from West Lake Sammamish Parkway Northeast and bisects the central region of the parcel. West Lake Sammamish Parkway Northeast borders the northwest boundary of the property. Residential properties border the southwest and northeast property lines and Lake Sammamish borders the southeast property line. An approximate location of the project site is shown on the Vicinity Map, presented as Figure 1. A layout of the site is shown on the Site Plan in Figure 2.

The ground surface within the site is generally steeply to moderately sloping down to the southeast. Slopes were measured at approximately 40 percent directly west of the planned wall alignment and as steep as 100 percent extending to the west. The site is developed with a single-family residence in the southeastern portion of the site. The steep slope in the northwestern region of the parcel is vegetated with typical northwest trees and undergrowth.

At the time of our explorations we observed the grading that had occurred for the planned parking lot expansion. We observed an approximate six to seven-foot-tall excavation cut located approximately 20 feet northwest of the site access road. The excavated subgrade southeast of the cut consisted of bare soils covered with plastic.

Field Explorations

We explored subsurface conditions at the site on November 17, 2020, by augering five holes with hand-held equipment. The hand augers were excavated to depths of approximately 1.0 to 4.0 feet below the ground surface. The existing slope cut was also profiled. The explorations were located in the field by a representative from this firm who also examined the soils and geologic conditions encountered, and maintained logs of the hand augers. The approximate locations of the hand augers are shown on the Site Plan in Figure 2. The soils were visually classified in general accordance with the Unified Soil Classification System, a copy of which is presented as Figure 3. The logs of the hand augers are presented in Figures 4 and 5.

Subsurface Conditions

The subsurface conditions at the site are briefly described below, based upon our completed field explorations of soils, and review of geologic maps available for the site. For a more detailed description of the soils encountered, review the Hand Auger Logs in Figures 4 and 5.

Stratigraphy/Soil Conditions

Based on our completed hand auger explorations, we interpret that the subsurface stratigraphy in the area of the planned wall construction can be grouped into 1 soil unit: hard/very dense soils interpreted as pre-Fraser sedimentary deposits (**Qpf**).

Pre-Fraser Sedimentary Deposits: The encountered soils consisted of glacially overridden pre-Fraser sedimentary deposits to the depths explored up to 4 feet in depth.

The sedimentary deposits generally consists of dense/very stiff to very dense/hard, moist, gray to brown layers of silty fine sand and silt. Black, dense to very dense, moist, silty sand layers with high organic content were observed interbedded within the silty sand and silt layers. The organic layers were observed to be horizontally bedded. The layers appear to range in thickness from approximately 1 to 2 feet. We interpret the interbedded soils to be more extensive than the portions observed from sampling.

Hydrologic Conditions

Groundwater seepage was not encountered within our subsurface explorations. Water was observed seeping over the top of the slope cut during our explorations at the base of a topsoil layer. We consider this water to be perched over the hard silt soils observed in our explorations. The dense to very dense/very stiff to hard pre-Fraser deposits interpreted to underlie the site are considered poorly draining. During the wetter times of the year, we expect perched water conditions will occur as pockets of water on top of the sedimentary layer. Perched water does not represent a regional groundwater "table" within the upper soil horizons. Volumes of perched groundwater vary depending upon the time of year and the upslope recharge conditions.

CONCLUSIONS AND RECOMMENDATIONS

Summary of Geotechnical Considerations

It is our opinion that the project area can be restored back to original conditions prior to the excavation occurring for the planned parking area expansion. The location of the previously performed excavation was located at the toe of a steep slope. We have not been contracted to evaluate the slope, but to restore the site back to its original condition. We have provided a wall design that, in our opinion, will provide a more robust wall system than what previously existed.

Seismic Engineering

Seismic Design

Seismic design for the 2015 International Building Code (IBC) is based on the mapped values for the risk-targeted maximum considered earthquake (MCE_R). Ground motion values in these maps include a probability of exceedance equal to 2% in 50 years, which corresponds to a 2,475-year return period. These mapped values have been prepared by the USGS in

collaboration with the FEMA-funded Building Seismic Safety Council (BSSC) and the American Society of Civil Engineers (ASCE).

The mapped MCE_R spectral response accelerations are referred to as S_s for short periods (0.2 seconds) and S_1 for a 1 second period. IBC 2015 directs that correction factors be applied to these response spectra based on an evaluation of site specific subsurface conditions, referred to as the soil site class (defined in ASCE 7 Section 20.3). The corrected MCE_R parameters are referred to as S_{MS} and S_{M1} . IBC 2015 defines the design spectral acceleration parameters as two-thirds of the corrected parameters, resulting in the values of S_{DS} for short periods and S_{D1} for the one-second period.

Seismic design for geologic hazards including slope stability, liquefaction, seismic settlement, lateral spreading, and other seismic risks follow ASCE 7. The seismic design procedures in this standard are based on MCE_R peak ground acceleration (PGA) multiplied by a correction factor for site-specific amplification (F_{PGA}). This results in a site-modified peak ground acceleration (PGA_M). From the site risk category and design spectral response acceleration parameters S_{DS} and S_{D1} , the site is assigned a seismic design category (ASCE 7 section 11.6).

We obtained seismic design parameters for this site from the Structural Engineers Association of California Seismic Design Maps Tool (SEAOC). Input values based on our understanding of the proposed project and our interpretations of subsurface conditions (described in **Section 0**) are shown in **Table 1**, below. The output summary report from the SEAOC is included in this report as **Appendix A**, and the seismic design parameters are shown in **Table 2**, below.

Table 1: Seismic Design Inputs

Seismic Design Maps Tool Inputs	Value
Site Latitude	47.622151
Site Longitude	-122.091050
Site Class	C
Risk Category	I-III

Table 2: Seismic Design Parameters

2012/15 IBC Design Parameter	Recommended Value
Seismic Design Category	D
PGA_M (2% in 50 years – 2,475 year event)	0.514

Retaining Wall Design

Retaining wall systems should be designed systems. An MSE wall design was prepared for this site to closely mimic pre-excavation site configurations. We understand the original wall existed with heights up to approximately 4.5 feet with some embedment. We completed local stability of the original wall system. The factors of safety are 1.0 for overturning and 1.3 for sliding.

StoneTerra blocks were chosen for the design of the new wall system. Our factors of safety in the new wall design meet engineering standards and are above the original wall factors of safety. Therefore, the new wall satisfy the City of Bellevue's recommendation of a wall replaced to at least the stability of the previous condition.

The wall design using the StoneTerra blocks is provided in **Appendix B** to this letter. The StoneTerra blocks are constructed so that an automatic 1 inch setbacks exist between stacked blocks. This creates an approximate 2.5 degree batter. Geogrid reinforcing is required between the stacked blocks. Our design was prepared using Synteen SF35 geogrid. Alternate blocks and reinforcing could be considered, but would require specific design.

The new wall was design requires a 2 Horizontal to 1 Vertical (2H:1V) backslope angle immediately behind the block facing . This slope configuration appears to meet pre-excavation cut geometry.

Fill soils placed behind the planned wall should consist of free draining granular soils. We recommend a material such as pit run, gravel borrow, or crushed rock be used for backfill. The backfill should be placed according to structural fill specification as presented below, and compacted with equipment large enough to reach compaction depth. In-place density tests should be performed to evaluate if backfill is meeting structural fill specifications. If large equipment cannot access behind the planned retaining wall, lift sizes should be decreased. We can evaluate lift sizes for smaller equipment once known.

The backfill slope behind the wall will be required to be revegetated with regional plant species. We recommend that plant species with drought tolerant characteristics be considered for revegetating the slope. We do not recommend a species that will require significant watering. A maximum of one foot of planting soil with up to 5 percent organics should be placed on the slope above the wall to provide growing media.

Structural Fill

All fill placed for wall construction should be placed as structural fill. Structural fill, by definition, is placed in accordance with prescribed methods and standards, and is observed by an experienced geotechnical professional or soils technician. Field observation procedures would include the performance of a representative number of in-place density tests to document the attainment of the desired degree of relative compaction.

Materials: Imported structural fill should consist of a good quality, free-draining granular soil, free of organics and other deleterious material, and be well graded to a maximum size of about 3 inches. Imported, all-weather structural fill should contain no more than 5 percent fines (soil finer than a Standard U.S. No. 200 sieve), based on that fraction passing the U.S. 3/4-inch sieve.

Fill Placement: Following subgrade preparation, placement of the structural fill may proceed. Fill should be placed in 8- to 10-inch-thick uniform lifts, and each lift should be spread evenly and be thoroughly compacted prior to placement of subsequent lifts. Structural fill should be compacted to at least 95 percent of its maximum dry density. Maximum dry density, in this report, refers to that density as determined by the ASTM D1557 compaction test procedure. The moisture content of the soil to be compacted should be within about 2 percent of optimum so that a readily compactable condition exists. It may be necessary to overexcavate and remove wet surficial soils in cases where drying to a compactable condition is not feasible. All compaction should be accomplished by equipment of a type and size sufficient to attain the desired degree of compaction.

Use of this Letter

We have prepared this report for Mr. Kenneth McGowan and his agents, for use in planning and design of this project. The data and report should be provided to prospective contractors for their bidding and estimating purposes, but our report, conclusions and interpretations should not be construed as a warranty of subsurface conditions.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report, for consideration in design. There are possible variations in subsurface conditions. We recommend that project planning include contingencies in budget and schedule, should areas be found with conditions that vary from those described in this report. We recommend that we be retained to verify conditions described in this letter exist in the field at the time of construction.

Within the limitations of scope, schedule and budget for our services, we have strived to take care that our services have been completed in accordance with generally accepted practices followed in this area at the time this report was prepared. No other conditions, expressed or implied, should be understood.

o O o

Geotechnical Letter-Report
McGowan Residence Wall Design
Bellevue, Washington
RN File No. 3471-001A
January 15, 2021
Page 7

We appreciate the opportunity to be of service to you. If there are any questions concerning this report or if we can provide additional services, please call.

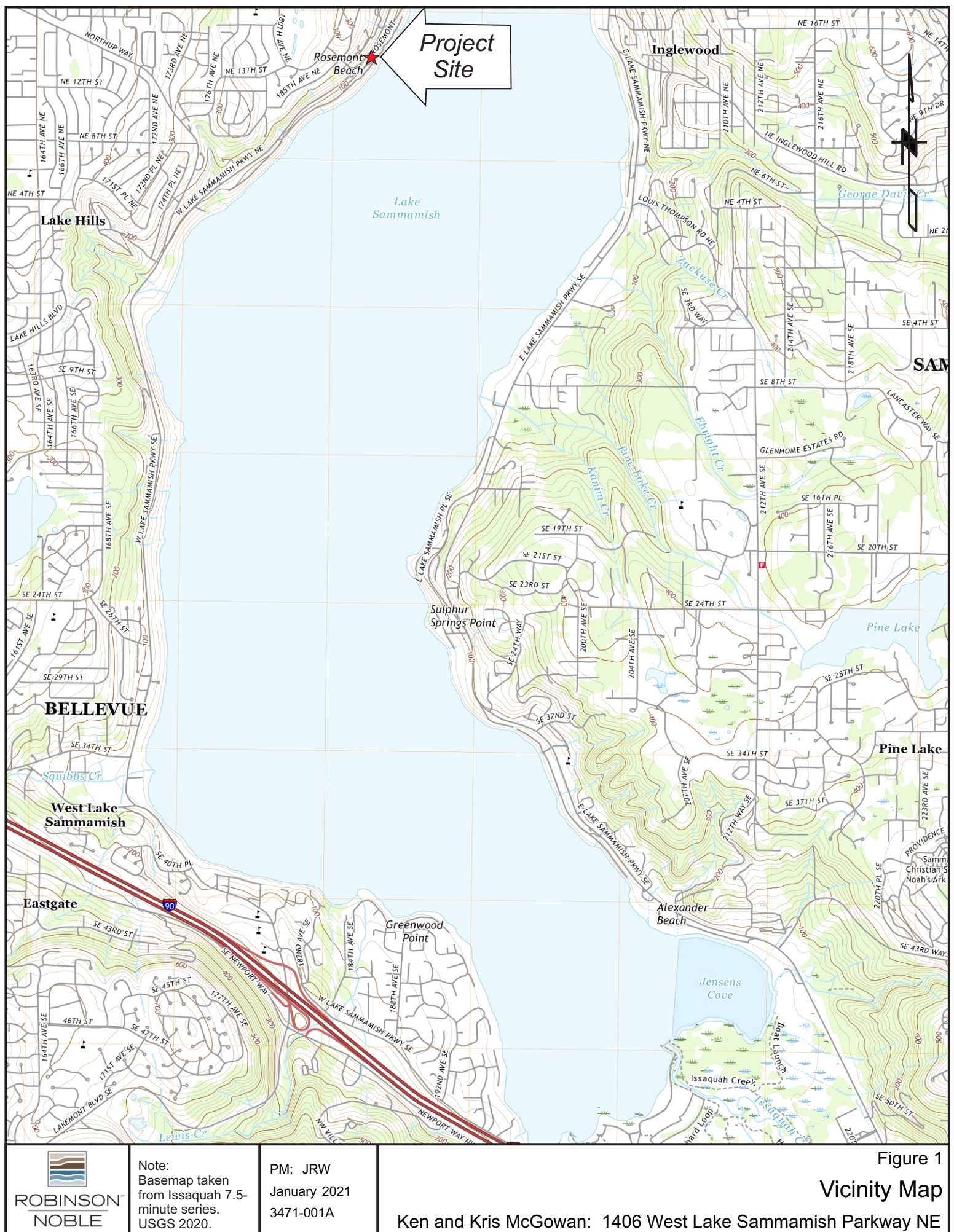
Sincerely,
Robinson Noble, Inc.

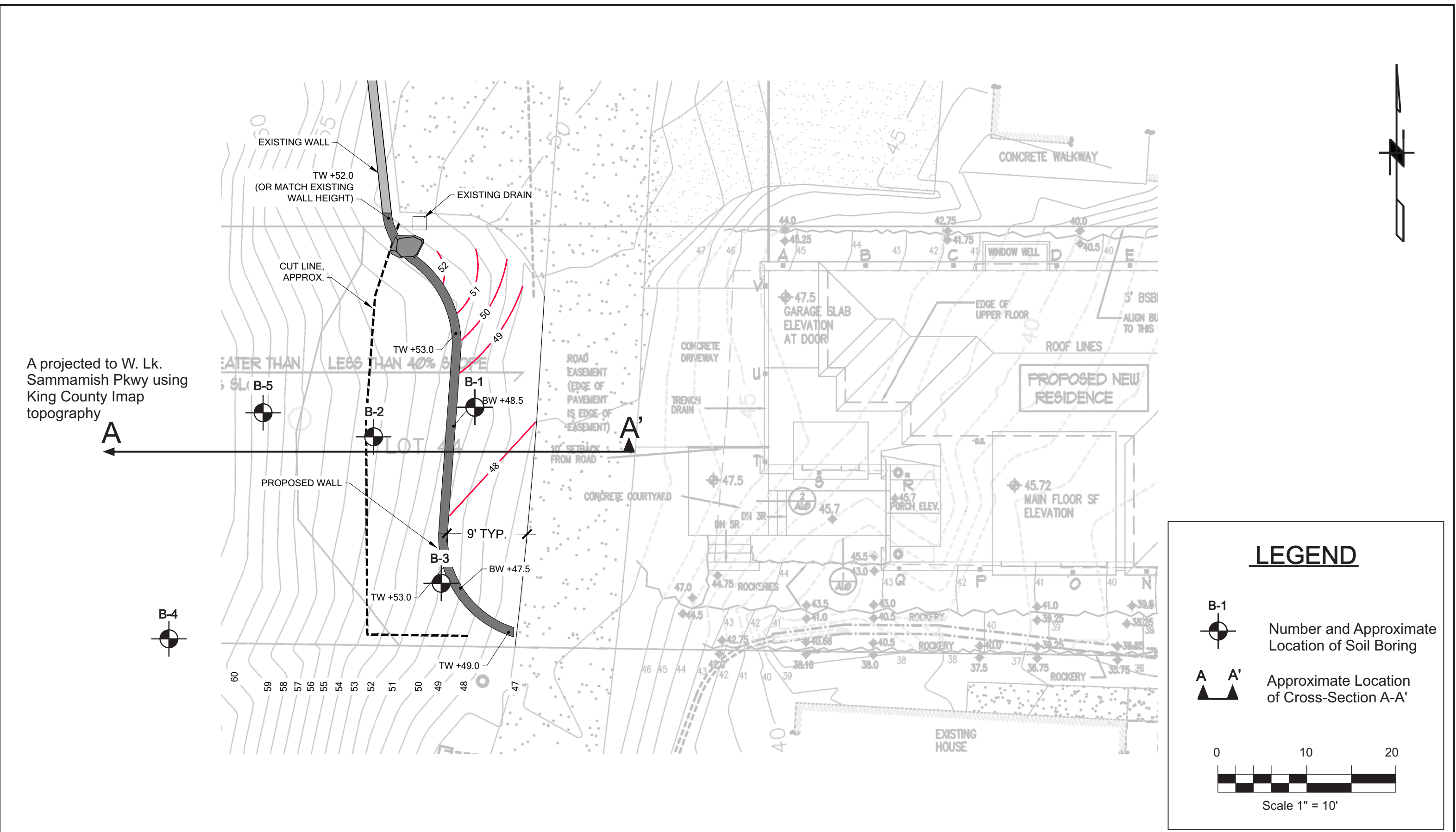


Jeff R. Wale, PE
Senior Project Engineer

JRW:RBP:am

Five Figures
Appendix A – Design Maps Summary Report
Appendix B – StoneTerra Wall Design





UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE - GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE - GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50%	INORGANIC	ML	SILT
			CL	CLAY
	SILT AND CLAY LIQUID LIMIT 50% OR MORE	ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
			MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
		INORGANIC	CH	CLAY OF HIGH PLASTICITY, FAT CLAY
			ORGANIC	OH
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

- * 1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.
- * 2) Soil classification using laboratory tests is based on ASTM D 2487-93.
- 3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance, of soils, and/or test data.

* Modifications have been applied to ASTM methods to describe silt and clay content.

$$N_{60} = N_M \cdot C_E \cdot C_B \cdot C_R \cdot C_S$$

N_M = blows/foot, measured in field
 C_E = $ER_m/60$, convert measured hammer energy to 60% for comparison with design charts.
 C_B = adjusts borehole diameter
 C_R = rod length, adjusts for energy loss in rods
 C_S = Sample liner = 1.0

SOIL MOISTURE MODIFIERS

Dry- Absence of moisture, dusty, dry to the touch

Moist- Damp, but no visible water

Wet- Visible free water or saturated, usually soil is obtained from below water table

KEY TO BORING LOG SYMBOLS



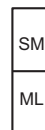
Ground water level



Blows required to drive sample 12 in. using SPT (converted to N_{60})

MC (■) = % Moisture = $\frac{(\text{Weight of water})}{(\text{Weight of dry soil})}$

DD = Dry Density



— Letter symbol for soil type
 — Contact between soil strata
 (Dashed line indicates approximate contact between soils)
 — Letter symbol for soil type

NOTE: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual

LOG OF EXPLORATION

DEPTH	USC	SOIL DESCRIPTION
HAND AUGER ONE		
0.0 – 0.8	SM	Gray silty fine sand (dense, moist)
0.8 – 1.0	SM	Black silty fine to medium sand with organics (very dense, moist)
		GROUND WATER SEEPAGE WAS NOT ENCOUNTERED HAND AUGER CAVING WAS NOT ENCOUNTERED HAND AUGER REFUSAL AT 1.0 FEET ON 11/17/2020
HAND AUGER TWO		
0.0 – 1.8	SM	Gray silty fine sand (dense, moist)
1.8 – 2.0	SM	Black silty fine to medium sand with organics (very dense, moist)
		GROUND WATER SEEPAGE WAS NOT ENCOUNTERED HAND AUGER CAVING WAS NOT ENCOUNTERED HAND AUGER REFUSAL AT 2.0 FEET ON 11/17/2020
HAND AUGER THREE		
0.0 – 0.6	SM	Gray silty fine sand (dense, moist)
0.6 – 0.7	SM	Black silty fine to medium sand with organics (very dense, moist)
		GROUND WATER SEEPAGE WAS NOT ENCOUNTERED HAND AUGER CAVING WAS NOT ENCOUNTERED HAND AUGER REFUSAL AT 0.7 FEET ON 11/17/2020
HAND AUGER FOUR		
0.0 – 1.8	SM	Dark brown silty fine sand with organics (loose, wet) (TOPSOIL)
1.8 – 4.0	ML	Grey silt (stiff to very stiff, moist)
		GROUND WATER SEEPAGE WAS NOT ENCOUNTERED HAND AUGER CAVING WAS NOT ENCOUNTERED HAND AUGER COMPLETED AT 4.0 FEET ON 11/17/2020

LOG OF EXPLORATION

DEPTH	USC	SOIL DESCRIPTION
HAND AUGER FIVE		
0.0 – 1.7	SM	Dark brown silty fine sand with organics (loose, wet) (TOPSOIL)
1.7 – 3.5	ML	Grey silt (stiff to very stiff, moist)
GROUND WATER SEEPAGE WAS NOT ENCOUNTERED HAND AUGER CAVING WAS NOT ENCOUNTERED HAND AUGER COMPLETED AT 4.0 FEET ON 11/17/2020		
SLOPE CUT		
0.0 – 2.0	SM	Dark brown silty fine sand with organics (loose, wet) (TOPSOIL)
2.0 – 4.5	ML	Grey silt (very stiff to hard, moist)
4.5 – 5.0	SM	Black silty fine to medium sand with organics (very dense, moist)
5.0 - 6.0	SM	Gray silty fine sand (very dense, moist)

Appendix A

- Design Maps Summary Report



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NOBLE

RN File No. 3471-001A
January 2021



McGowan Wall

Latitude, Longitude: 47.622151, -122.091050



Date	12/7/2020, 3:57:01 PM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.27	MCE_R ground motion. (for 0.2 second period)
S_1	0.486	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.27	Site-modified spectral acceleration value
S_{M1}	0.638	Site-modified spectral acceleration value
S_{DS}	0.847	Numeric seismic design value at 0.2 second SA
S_{D1}	0.426	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.314	Site amplification factor at 1.0 second
PGA	0.514	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.514	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
S_{sRT}	1.27	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	1.303	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	1.889	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.486	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.514	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	0.74	Factored deterministic acceleration value. (1.0 second)
$PGAd$	0.719	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.975	Mapped value of the risk coefficient at short periods
C_{R1}	0.945	Mapped value of the risk coefficient at a period of 1 s

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Appendix B

- StoneTerra Wall Design



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RN File No. 3471-001A
January 2021

SPECIFICATIONS FOR STONETERRA RETAINING WALL

General:

- 1. The contractor shall have an approved set of plans and specifications on site at all times during the construction of the wall. The wall layout is the responsibility of the contractor.
- 2. A professional engineer or representative should observe the construction of the wall.
- 3. Synteen SF35 geogrid shall be used for this project. All geosynthetic reinforcement and facing materials shall be approved by the geotechnical engineer prior to installation.
- 4. The contractor may use longer reinforcement lengths than the design sections for ease of construction. The reinforcement lengths may not be shorter unless approved by the geotechnical engineer.

Subgrade Preparation:

- 1. The ground should be prepared by removing surficial unsuitable soil, exposing dense or firmer inorganic native soils as approved by the geotechnical engineer.
- 2. The excavation shall be cleaned of all excess material and protected, as necessary, from construction traffic to maintain the integrity of the subgrade.
- 3. Subgrade should be constructed level to provide natural 2.4° batter of block offsets.

Drainage:

- 1. A minimum 4 inch diameter, perforated PVC pipe should be placed behind the blocks as shown on the detail.
- 2. A 12-inch curtain drain should be located behind the blocks.

StoneTerra Blocks:

- 1. StoneTerra blocks should have a layout corresponding to the wall height as shown on this plan.
- 2. Stacked StoneTerra blocks should be placed in a manner such that the blocks are interconnected, and per the manufacturer's recommendations.
- 3. StoneTerra blocks have dimensions of 2 feet by 2 feet by 4 feet. The cap block has dimensions of 1 foot by 2 feet by 4 feet, if needed. Alternative stacking will be required for other block sizes.
- 4. Corners shall be constructed per the manufacturer's recommendations.
- 5. The wall shall have a minimum batter of 1 Horizontal to 24 Vertical (1H:24V).

Embedment:

- 1. Base blocks should be embedded into bearing, native undisturbed soils.

Geosynthetic Reinforcement Placement:

- 1. The reinforcement shall be rolled out, cut to length, and laid at the proper elevation, location and orientation. Orientation of the reinforcement is of extreme importance since geosynthetics vary in strength with roll direction. The contractor shall be responsible for the correct orientation.
- 2. Geosynthetic reinforcement shall be placed at the location and elevations shown on the plans. The reinforcement length is measured from the front face of the StoneTerra block.
- 3. Geosynthetic reinforcement shall be fastened between the facing blocks. Prior to placing fill, the reinforcement shall be pulled to remove the slack and stretched by hand until taut and free of wrinkles.
- 4. Geosynthetic reinforcement and facing materials shall be placed in accordance with the manufacturer's recommendations.

Fill Placement:

- 1. Structural fill, consisting of granular import soils with no greater than ¾ inch in size and less than 10% passing the No. 200 sieve, would then be placed upon the subgrade and geosynthetic reinforcement. If larger rock is used in the fill, additional layers of geosynthetic reinforcement may need to be used. The contractor shall prevent damage to the geosynthetic reinforcement by placing a loose first lift of structural fill with at least a 10-inch thickness. The geotechnical engineer shall approve the material placed in the reinforced zone, before placement.
- 2. Low permeability fill with greater than 30% passing the No. 200 sieve should be placed in the top 1 foot of the wall backfill to reduce surface flow into the structural fill. Low permeability fill should have 5% organics or less. An alternative approach would be to place a low permeability geomembrane between structural fill and surface fill, if roots from proposed landscaping will not penetrate.
- 3. Soil density tests should be performed as designated by the geotechnical engineer.
- 4. Fill soils in the wall area shall be compacted to at least 95% of the Maximum Dry Density (MDD) as determined by ASTM D-1557 Maximum Dry Density.
- 5. The soil shall be placed in relatively uniform horizontal loose lifts not exceeding 10 or 12 inches in thickness. The lift thickness shall not exceed the manufacturer's recommended depth for the compactive device used on the project.

Inspection:

The construction shall be periodically observed under the direction of an engineer registered in the state of Washington with experience in the design of gravity retaining walls.

Design Parameters:

Retained Soil: $\Phi = 34$ deg, $\gamma = 125$ pcf, $c = 0$ psf
Foundation Soil: $\Phi = 34$ deg, $\gamma = 125$ pcf, $c = 0$ psf
Retained Backfill: $\Phi = 38$ deg, $\gamma = 125$ pcf, $c = 0$ psf

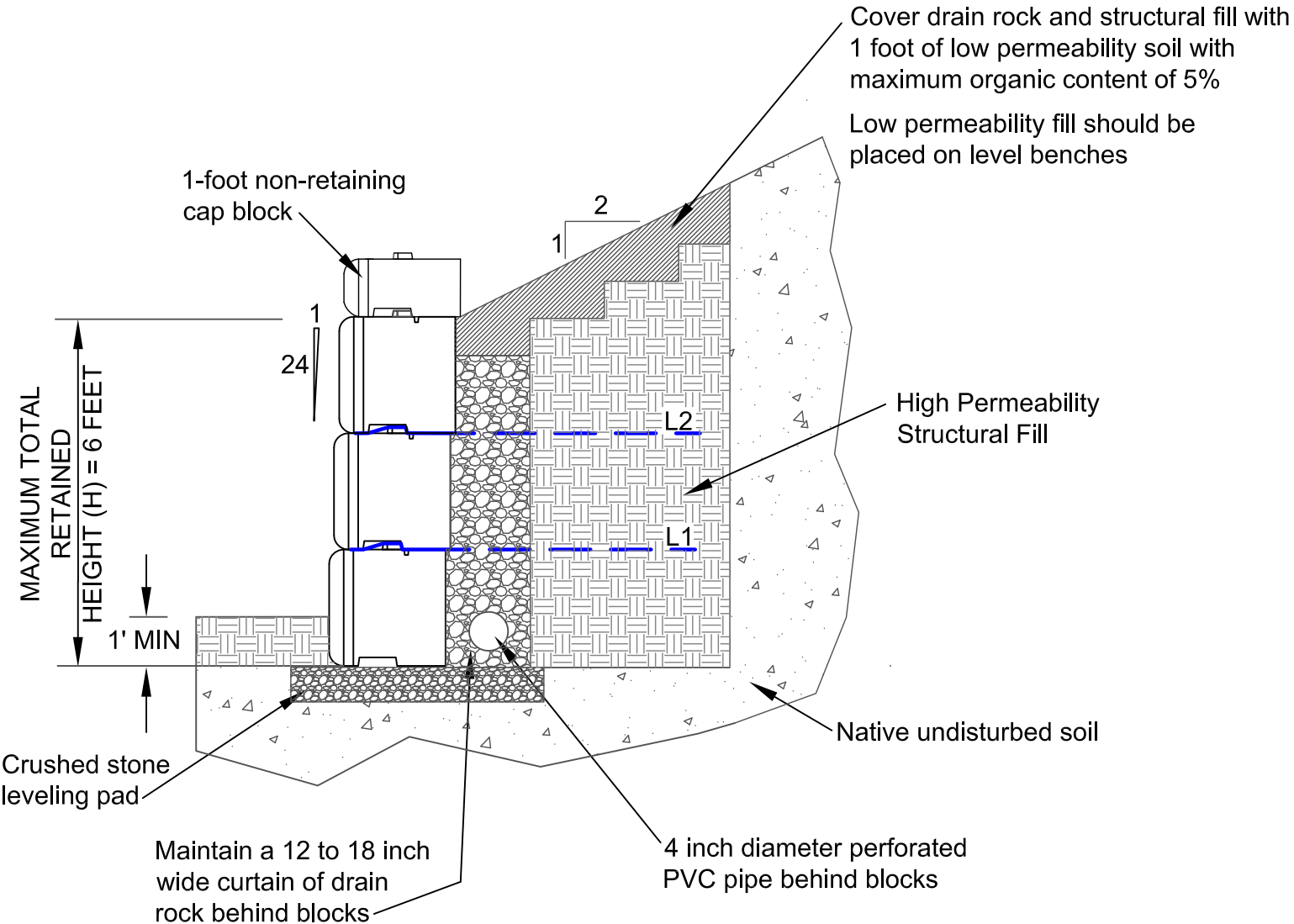
External Loading:

Seismic acceleration = 0.514g

External Stability:

Minimum Factor of Safety against Base Sliding = 1.5 Static; 1.125 Seismic
Minimum Factor of Safety against Overturning = 2.0 Static; 1.5 Seismic

STONETERRA RETAINING WALL
(NOT TO SCALE)



Geosynthetic Reinforcement Schedule

TOTAL RETAINED HEIGHT (FT.)	GEOSYNTEHTIC REINFORCEMENT			REINFORCEMENT POSITION (HEIGHT ABOVE LEVELING PAD, FT.)	
	TYPE	No. LAYERS	L (FT.)	L1	L2
6	Synteen SF35	2	6.0	2.0	
	Synteen SF35				4.0



Note:

PM: JRW
January 2021
3471-001A

Figure B1

StoneTerra Retaining Wall

Ken and Kris McGowan: 1406 West Lake Sammamish Parkway NE



UltraWall

Project: McGowan Residence
 Location: Sammamish
 Designer: JRW
 Date: 1/6/2021
 Section: Section 1
 Design Method: NCMA_09_3rd_Ed, Ignore Vert. Force
 Design Unit: StoneTerra
 Seismic Acc: 0.514

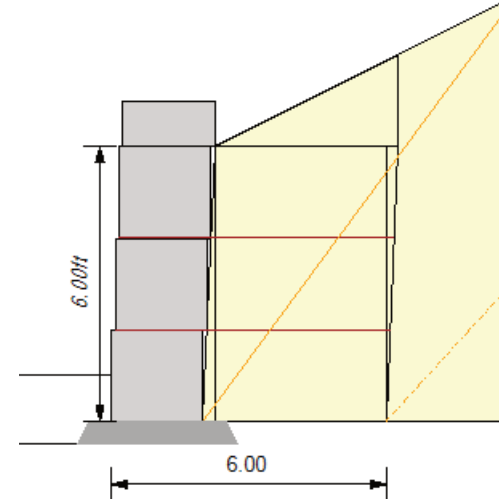
SOIL PARAMETERS	ϕ	coh	γ
Reinforced Soil:	38 deg	0psf	125pcf
Retained Soil:	34 deg	0psf	125pcf
Foundation Soil:	34 deg	0psf	125pcf
Leveling Pad: Crushed Stone			

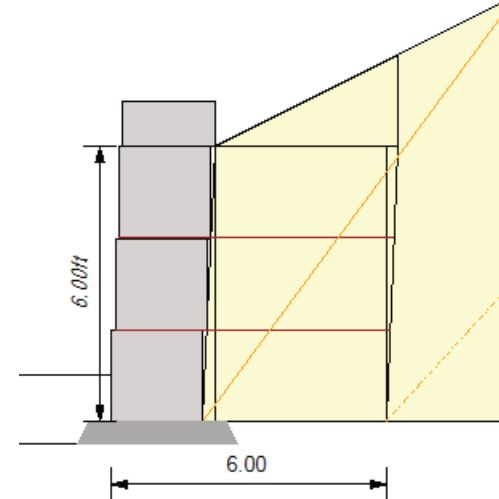
GEOMETRY

Design Height:	6.00ft (5.00ft Exp.)	Live Load:	0psf
Wall Batter/Tilt:	2.40/ 0.00 deg	Live Load Offset:	0.00ft
Embedment:	1.00ft	LL2 Width:	0ft
Leveling Pad Depth:	0.50ft	Dead Load:	0psf
Slope Angle:	26.6 deg	Dead Load Offset:	0.0ft
Slope Length:	100.0ft	Dead Load Width:	0ft
Slope Toe Offset:	0.0ft		
Vertical δ on Single Depth			

FACTORS OF SAFETY (Static / Seismic)

Sliding:	1.50 / 1.13	Pullout:	1.50 / 1.13
Overturning:	2.00 / 1.50	Uncertainties:	1.50 / 1.13
Bearing:	2.00 / 1.50	Connection:	1.50 / 1.13
Shear:	1.50 / 1.13	Bending:	1.50 / 1.13





RESULTS (Static / Seismic)

FoS Sliding:	2.62 / [1.38]	FoS Overturning:	4.58 / [1.84]
Bearing	889 / [1,072]	FoS Bearing:	21.45 / [17.80]
Pullout	1.50		
Total Pullout	3,203	FoS Total Pullout	6.63
Total Pullout (S)	3,203	FoS Total Pullout (S)	6.63
Top FoSot:	19.61	FoS Connection:	3.66

ID	Ht	Lngh	Geogrid	Ta _{tn} [Ta _{tns}]	TMax [Tmd]	Tal/FS [seis]	FS Tal [seis]	PkCn [seis]	PkCn/FS [seis]	FS PO	FS Sldg
2	4.00	6.00	SF35	1271 [2008]	152 [382]	847 [1785]	8.38 [3.77]	520 [693]	5.15 [1.46]	5.18 [1.47]	19.12 [14.27]
1	2.00	6.00	SF35	1271 [2008]	269 [382]	847 [1785]	4.72 [3.08]	657 [876]	3.66 [1.51]	8.97 [3.71]	9.25 [5.44]

Column Descriptions:

- Ta: allowable geogrid strength
- Rc %: percent coverage for geosynthetics
- EP (Pa) internal active earth pressure
- LL (Pql) earth pressure due to live load surcharge
- DL (Pqd) earth pressure due to dead load surcharge
- Tmax maximum earth pressure on geosynthetic layer
- FSstr factor of safety on geogrid strength (Ta/Tmax)
- Ta cn allowable tension on the connection
- FS Pkcn, factor of safety on the connection (Ta cn/Tmax)
- FS PO, factor of safety on pullout (Ta pullout/(Tmax - LL)
- Grid Embedment, depth of embedment beyond the theoretical failure plane.



GEOGRID REINFORCING

STRUCTURAL PROPERTIES: Synteen

GEOGRID PROPERTIES

Name	Tult	RFcr	RFd	RFid	Ci	Cd	Alpha	Ltds
SF35	3600	1.58	1.10	1.63	0.90	0.90	0.80	1271

CONNECTION STRENGTHS

Geogrid	Slope 1	Intercept 1	Peak Break	Slope 2	Intercept 2	Max Normal	Rup Conn	Conn Creep	Tlot (%)	Tlot
SF35	21.00	475	-1	0.00	0	2880	False	1.58	100	3600
SF55	22.00	555	-1	0.00	0	3840	False	1.58	100	5000
SF65	26.00	505	-1	0.00	0	4800	False	1.58	100	6200
SF80	25.00	590	-1	0.00	0	6000	False	1.58	100	7550
SF90	23.00	1030	-1	0.00	0	7200	False	1.58	100	9000

SHEAR STRENGTHS

Slope 0 deg

Intercept 4000psf

CALCULATION RESULTS

OVERVIEW

UltraWall calculates stability assuming the wall is a rigid body. Forces and moments are calculated about the base and the front toe of the wall. The base block width or bottom reinforcement length is used in the calculations. The concrete units, granular fill over the blocks or reinforced zone soils are used as resisting forces.

EARTH PRESSURES

The method of analysis uses the Coulomb Earth Pressure equation (below) to calculate active earth pressures. Wall friction is assumed to act at the back of the wall face. The component of earth pressure is assumed to act perpendicular to the boundary surface. The effective delta angle is delta minus the wall batter at the back face (assumed to be vertical). If the slope breaks within the failure zone, a trial wedge method of analysis is used.

INTERNAL EARTH PRESSURES

Effective internal Delta angle (2/3 phi)
Coefficient of active earth pressure
Internal failure plane

delta =25.3 deg
ka =0.293
ρ = 53.6 deg

EXTERNAL EARTH PRESSURES

Effective external Delta angle
Coefficient of active earth pressure
External failure plane

delta =34.00 deg
ka =0.240
ρ = 47.7 deg

$$K_a = \frac{\cos^2(\phi_1 + i)^2}{\cos^2(i)^2 \cdot \cos(\delta_1 - i) \left(1 + \frac{\sin(\phi_1 + \delta_1) \cdot \sin(\phi_1 - \beta)}{\cos(\delta_1 - i) \cdot \cos(i + \beta)} \right)^2}$$

FORCES AND MOMENTS

UltraWall resolves all the geometry into simple geometric shapes to make checking easier. All x and y coordinates are referenced to a zero point at the front toe. The wall image can be exported to CAD for a more detailed output.

Name	Factor γ	Force (V)	Force (H)	X-len	Y-len	Mo	Mr
Face Blocks(W1)	1.00	1536	--	0.98	--	--	1503
Soil Fill(W0)	1.00	328	--	1.47	--	--	483
Soil(W2)	1.00	65	--	2.17	--	142	--
Soil(W3)	1.00	2811	--	4.13	--	--	11599
Soil(W4)	1.00	94	--	6.08	--	--	574
Slope(W5)	1.00	501	--	4.28	--	--	2143
Pa_h	1.00	--	828	--	2.68	2221	--
Sum (V, H)	1.00	5336.61	828.26		Sum Mom	2221.39	16444.76

W0: leveling pad

W1: facing units

W2: soil wedge behind the face

W3: rectangular area in MSE area

W4: the wedge at the back of the mass

W5: slope area over the mass

W6: Rectangle zone in broken back

W7: Live load over the mass

W8: Dead load over the mass

W9: Force Pa

W10: Surcharge load Paq

W11: Dead Load Surcharge Paqd

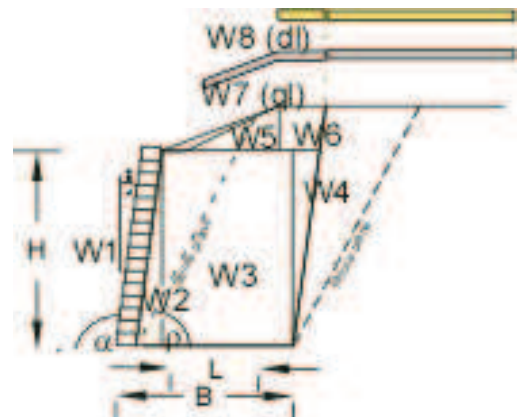
X-Len: is measured from the center of the base (+) Driving, (-) Resisting.

Pa_h: horizontal earth pressure

Pa_v: vertical earth pressure

Pq_h: horizontal surcharge pressure

Pq_v: vertical surcharge pressure





BASE SLIDING

Sliding at the base is checked at the soil-to-soil interface between the reinforced mass and the foundation soil.

Forces resisting sliding = (SumVr- W0 - W1 - W7)

$$5,337 - 328 - 1,536 - 0$$

$$\text{SumVr} = 3,472\text{ppf}$$

Resisting force = SumVr x tan(34) + c x L + Base Shear

$$\text{Rf1} = 3,507$$

where L is the base width

where Base Shear = N tan(38.0) * 0.8

$$1,165.47$$

Driving force is the horizontal component of Pah + Pqh+ Pdh

$$\text{Df} = 828$$

Factor of Safety = Rf/Df

$$\text{FSsl} = 2.62$$



OVERTURNING ABOUT THE TOE

Overturning at the base is checked by assuming rotation about the front toe by the block mass, soil retained on the blocks or within the reinforced zone. Allowable overturning can be defined by eccentricity (e/L) or by the ratio of resisting moments divided by overturning moment (FSot).

Moments resisting overturning = $\text{Sum}(M1 \text{ to } M6) + MP_{av} + MP_{qv}$

Moments causing overturning = $MP_{ah} + MP_{qh}$

Factor of safety = Mr/Mo

$Mr = 16,445\text{ft-lbs}$

$Mo = 2,221\text{ft-lbs}$

$FSot = 4.58 \text{ OK}$



ECCENTRICITY AND BEARING

Eccentricity is the calculation of the distance of the resultant away from the centroid of mass. In wall ReinDesign the eccentricity is used to calculate an effective footing width, or in rigid structure, it is used to calculate the pressure distribution below the base.

Calculation of Eccentricity

$$e = (\text{SumMr} + M7 + \text{SumMo}) / \text{SumV}$$

$$\text{Mr} = -4,096.71$$

$$\text{Mo} = 5,883.18$$

$$e = (-4,096.715,883.18) / 5,336.61$$

$$e = -1.870$$

Because 'e' is negative (leaning into the embankment), it is ignored to get the maximum bearing at the face of the wall.

Calculation of Bearing Pressures

$$\text{Qult} = c * \text{Nc} + q * \text{Nq} + 0.5 * \gamma * (B') * \text{Ng}$$

where:

$$\text{Nc} = 42.16$$

$$\text{Nq} = 29.44$$

$$\text{Ng} = 41.06$$

$$c = 0.00 \text{psf}$$

$$q = 125.00 \text{psf}$$

$$B' = 9.74 \text{ft}$$

Calculate Ultimate Bearing, Qult

$$\text{Qult} = 19,078.90 \text{psf}$$

Applied Bearing Pressures = $(\text{SumVert} / B' + (2B + \text{LP depth}) / 2 * \text{LP depth} * \gamma)$

$$\sigma = 889.44 \text{psf}$$

Calculated Factors of Safety for Bearing

$$\text{Qult} / \sigma = 21.45$$



TENSION CALCULATIONS

Tmax is the maximum tension in the reinforcing based on the earth pressure and surcharge loads applied. In the NCMA design method, earth pressures are calculated using the Coulomb Earth pressure equation. Infinite surcharge loads are applied as $q \times k_a$. In designs where there is a broken back slope, or the surcharge is not uniform over the area, a tie-back wedge analysis method is used.

$$FS = (T_a \times FS_{tn}) / T_{max}$$

TABLE OF RESULTS

Elevation[ft]	k_a	z	sv	Name[ft]	Tult[ppf]	Ta[ppf]	Rc %	Tmax[ppf]	FS
4.00	0.293	1.50	3.00	SF35	3,600	847	100	152	8.38
2.00	0.293	4.00	2.00	SF35	3,600	847	100	269	4.72



PULLOUT CALCULATIONS

Pullout is the amount of resistance of the reinforcing has to a pullout failure based on the Tmax applied and the depth of embedment (resistance). In an NCMA design the failure place is defined as the Coulomb failure plane which varies with face batter, backslope angle, and surcharge loads applied. All failure planes begin at the tail. of the facing units.

For AASHTO calculations, the live load surcharge is not included in the Tmax value for pullout.

Failure Plane Angle (ρ) = 53.6 Deg

NOTE: The pullout capacity is limited by the Ultimate Strength of the reinforcing layer, not the ultimate pullout capacity calculated.

$$F^* = 0.67 \times \tan(\phi) = 0.67 \times 0.78 = 0.52$$

$$Le = \text{embedment length} = Li - \text{block depth} - hi * \tan(90 - \rho)$$

$$La = Li - Le$$

sv = geogrid spacing

Rc = % coverage

α = scale effect correction

$$\text{Pullout} = 2 \times Le \times F^* \times sv \times \alpha \times Rc$$

TABLE OF RESULTS

Elevation[ft]	Normal[lbf]	Ci	% Coverage	Tmax[ppf]	Le[ft]	La[ft]	Pullout_[Pr][ppf]	FS PO
4.00	558.69	0.90	100	151.58	1.22	4.78	785.69	5.18
2.00	1718.73	0.90	100	269.48	2.61	3.39	2417.08	8.97



CONNECTION CALCULATIONS

Connection is the amount of resistance of the reinforcing has to a pullout failure from the facing units based on the Tmax applied and the normal load on the units. In an AASHTO LRFD design, creep on the connection may be applied for frictional and mechanical connections. In NCMA or AASHTO 2002, a frictional failure is based on the peak connection capacity divided by a factor of safety. For a rupture connection the capacity is the peak load divided by a creep reduction factor and a factor of safety.

Frictional Connection

$$\text{Peak Connection} = N(\text{ppf}) \tan(\text{slope}) + \text{intercept}$$

Rupture Connection

$$\text{Connection Capacity} = [N(\text{ppf}) \tan(\text{slope}) + \text{intercept}] / \text{RFcr}$$

RFcr can be a value obtained from long-term testing or by default could be the creep reduction factor of the geogrid reinforcing.

$$\text{Tal_cn} = \text{Allowable connection capacity} = \text{Tult_cn} / \text{FS cn}$$

$$\text{Rc} = \% \text{ coverage}$$

$$\text{FS} = \text{Tal_cn} * \text{FS cn} / \text{Tmax}$$

TABLE OF RESULTS

Elev[ft]	Name[ft]	Tmax[ppf]	Ttotal[ppf]	Rc %	N[ppf]	Avail_CN[ppf]	FS cn	FS cns
4.00	SF35	151.58	381.51	100	794.89	2	3.43	1.36
2.00	SF35	269.48	381.51	100	1329.77	2	2.44	1.72

SEISMIC CALCULATIONS

The loads considered under seismic loading are primarily inertial loadings. The wave passes the structure putting the mass into motion and then the mass will try to continue in the direction of the initial wave. In the calculations you see the one dynamic earth pressure from the wedge of the soil behind the reinforced mass, and then all the other forces come from inertia calculations of the face put into motion and then trying to be held in place.

Design Acceleration A = 0.514
 Displacement (d) d = 5.0in

Design Acceleration Coefficient Displacement kh(int) = 0.215
 $Kh_d = 0.74 A (A/d)^{0.25} =$
 Design Acceleration Coefficient Displacement Based (empirically)
 $Kh_d = 0.74 A (A/d)^{0.25} =$ kh(ext) = 0.215
 Vertical Acceleration kv = 0.000

SEISMIC THRUST

INTERNAL Kae

Kae Kae = 0.972
 $D_Kae = Kae - Ka = (0.972 - 0.293)$ D_Kae = 0.679

EXTERNAL Kae

Kae Kae = 1.179
 $D_Kae = Kae - Ka = (1.179 - 0.000)$ D_Kae = 0.791
 $Pae = 0.5 * \gamma(H)^2 * D_Kae$ Pae = 2,089ppf
 $Pae_h/2 = Pae * \cos(\delta)/2$ Pae_h/2 = 866ppf
 $Pae_v/2 = Pae * \sin(\delta)/2$ Pae_v/2 = 584ppf

INERTIA FORCES OF THE STRUCTURE

Face (Pif) = $(W1) * kh(ext) = 1,536 * 0.215$ Pif = 331ppf
 Mass (Pir) = $(W) * kh(ext) = 2,661 * 0.215$ Pir = 573ppf
 Slope (Pis) = $(W) * kh(ext) = 49 * 0.215$ Pis = 11ppf
 Dead Load(Pidl) = $(DL) * kh(ext) = 0 * 0.215$ Pidl = 0ppf

TABLE OF RESULTS FOR SEISMIC REACTIONS

Name	Force (V)	Force (H)	X-len	Y-len	Mo	Mr
Face Blocks(W1)	1536	--	0.98	--	--	1503
Soil(W2)	65	--	2.17	--	--	142
Soil(W3)	2811	--	4.13	--	--	11599
Soil(W4)	94	--	6.08	--	--	574
Slope(W5)	501	--	4.28	--	--	2143
Pa_h	--	828	--	2.68	2221	--
Pir	--	573	--	3.00	1719	--
Pif	--	331	--	3.25	1075	--
Pis	--	11	--	6.54	69	--
Pae_h/2	--	1779	--	3.00	2597	--
Pae_v/2	1094	--	0.21	--	--	229
Sum V / H	5883.83	2632.24		Sum Mom	7682.28	16674.11



TENSION CALCULATIONS, SEISMIC

Tmax is the maximum tension in the reinforcing based on the earth pressure and surcharge loads applied.

For walls with extensible reinforcing, the inertial force shall be distributed uniformly to the reinforcements on a load per unit width of wall bases as follows:

$$T_{md} = (P_i/n)$$

where:

Tmd = incremental dynamic inertia force at Layer i

Pi = internal inertia force due to the weight of backfill within the active zone,

KhWa = where Wa is the weight of the active zone and Kh is calculated as specified

n = total number of reinforcement layers in the wall

The total load applied to the reinforcement on a load per unit of wall width basis is determined as follows:

$$\text{Total} = T_{max} + T_{md}$$

where:

Tmax = the static load applied to the reinforcements.

In seismic design the mass is designed to resist the static and dynamic components of the load determined as:

$$S_{rs} \geq T_{max} RF / R_c$$

where the reinforcing must be able to resist the load at any time of its design life. Design for static loads require the strength of the reinforcement be reduced for creep and other degradation mechanisms. The dynamic load is a transient load and does not cause strength loss due to creep. The dynamic component of load for seismic design is:

$$S_{rt} \geq T_{md} RF_d / R_c$$

The strength required for Tmax requires reduction for creep (Rc), where the strength for Tmd does not include the effects of creep.

Srs = ultimate reinforcement tensile resistance required to resist static load component (kip/ft)

Srt = ultimate reinforcement tensile resistance required to resist dynamic load component.

Rc = reinforcement coverage ratio

RF = combined strength reduction factor to account for potential long-term degradation due to installation damage, creep, and chemical aging

RFid = strength reduction factor to account for installation damage to reinforcement

RFd = strength reduction factor to prevent rupture of reinforcement due to chemical and biological degradation

The required ultimate tensile resistance of the geosynthetic reinforcement shall be determined as:

$$T_{ult} = S_{rs} + S_{rt}$$



Table of Results, Seismic Tension

Elevation[ft]	Name	Ta[ppf]	Tas[ppf]	Coverage Ratio %	Tmax[ppf]	TSmax[ppf]	FS Str	FSs Str
4.00	SF35	2	2	100	2	2	5.59	11.77
2.00	SF35	2	2	100	2	2	3.14	6.62



PULLOUT CALCULATIONS, SEISMIC

Pullout is the amount of resistance of the reinforcing has to a pullout failure based on the Tmax applied and the depth of embedment (resistance). In an NCMA design the failure place is defined as the Coulomb failure plane which varies with face batter, backslope angle, and surcharge loads applied. All failure planes begin at the tail. of the facing units.

Failure Plane Angle (ρ) = 53.6 Deg

NOTE: The pullout capacity is limited by the Ultimate Strength of the reinforcing layer, not the ultimate pullout capacity calculated.

$$F^* = 0.67 \times \tan(\phi) = 0.67 \times 0.78 = 0.52$$

$$Le = \text{embedment length} = Li - \text{block depth} - hi * \tan(90 - \rho)$$

$$La = Li - Le$$

$$sv = \text{geogrid spacing}$$

$$Rc = \% \text{ coverage}$$

$$\alpha = \text{scale effect correction}$$

$$\text{Pullout} = 2 \times Le \times F^* \times sv \times \alpha \times Rc$$

TABLE OF RESULTS

Elev[ft]	Rc %	Tmax[ppf]	Ttotal[ppf]	Le[ft]	La[ft]	TRpo[ppf]	TRpos[ppf]	FS PO	FS SeisPO
4.00	100	2	2	1.22	4.78	2	2	5.18	2.59
2.00	100	2	2	2.61	3.39	2	2	8.97	4.48



CONNECTION CALCULATIONS, SEISMIC

Facing elements shall be designed to resist the seismic loads, i.e., T_{total} .

The required ultimate tensile resistance of the geosynthetic reinforcement at the connection is:

$$T_{ult} = S_{rs} + S_{rt}$$

In REA software, friction resistance at the base block is an option to reduce the tension on the bottom layer of reinforcement. Research has shown the tension in the bottom layer of reinforcement to be very low if not zero.

Base friction is used to reduce the tension in the bottom layer of reinforcing. The force in the bottom layer is the tension from half way to the reinforcing layer above to the halfway to the foundation level below.

$$\text{Base Friction} = 1165.47 / 1.50$$

$$b_s = 777 \text{ppf}$$

$$\text{Amount utilized to reduce bottom tension} = 185 \text{ppf}$$



TABLE OF RESULTS, Seismic Connection

Elev[ft]	Name[ft]	Tmax[ppf]	Ttotal[ppf]	Rc %	N[ppf]	Avail_CN[ppf]	FS cn	FS cns
4.00	SF35	151.58	381.51	100	794.89	2	3.43	1.36
2.00	SF35	269.48	381.51	100	1329.77	2	2.44	1.72